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PUBLIC LAND POLICY AND THE ENVIRONMENT. VOLUME 3. PART II (CONT'D): ENVIRONMENTAL PROBLEMS ON THE PUBLIC LANDS. CASE STUDIES 9 THROUGH 17

Rudolf W. Becking, et al

Rocky Mountain Center on Environment
Denver, Colorado

December 1970

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PUBLIC LAND POLICY AND THE ENVIRONMENT

Part II cont'd

Environmental Problems on the Public Lands

Case Studies 9 through 17

A Study Prepared for the
Public Land Law Review Commission

by

the Rocky Mountain Center on Environment
Denver, Colorado

Republished with revisions December 1970

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STANDARD TITLE PAGE FOR TECHNICAL REPORTS	1. Report No. PLLRC-29-3	2. Govt. Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle

Vol.3 : PUBLIC LAND POLICY AND THE ENVIRONMENT.
Part II cont'd: Environmental Problems on
the Public Lands

5. Report Date
12/1/70

6. Performing Organization Code

7. Author(s)
Rocky Mountain Center on Environment; Denver

8. Performing Organization Rept. No. 29

9. Performing Organization Name and Address
Public Land Law Review Commission
1730 K St., N. W.
Washington, D. C. 20006

10. Project/Task/Work Unit No.

11. Contract/Grant No.
70-C-4

12. Sponsoring Agency Name and Address
same as 9 above

13. Type of Report & Period Covered
interim

14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstracts

Part II contd (Vol.3) contains 9 case studies, each of which discusses land uses or management practices on public lands having environmental consequences. The overall implications of these cases. (See Vol. 2 for the rest of the studies which make up Environmental Problems on the Public Lands.)

17. Key Words and Document Analysis. 17a. Descriptors

environemental problems on public lands, case studies

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

18. Distribution Statement
available through N.T.I.S.

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page
UNCLASSIFIED

21. No. of Pages

22. Price

CASE STUDY NO. IX

PASS CREEK, ROSEBURG DISTRICT OF OREGON

COLOR ILLUSTRATIONS REPRODUCED
IN BLACK AND WHITE

Details of illustrations in
this document may be better
studied on microfiche

by

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RECITATION OF FACTS

Background Information

Douglas County, Oregon, consists of the Umpqua River basin. It forms a distinct economic unit in which Roseburg is the principal city (Fig. 1). More than 90% of the County's 3,240,320 acres are forested.

The economy of Douglas County rests first on the timber industry, second on agriculture and third on recreation and tourism (Douglas County Planning Commission). The payroll for timber harvesting and wood-using industries in 1963 was 38.9 million dollars, 54.4 percent of the total county payroll of 71.5 million. By comparison, agricultural products sold for 6.6 million dollars in 1964 and 8.0 million in 1967.

Maki, Shcallau and Beuter (1968) found the Roseburg economic area more dependent upon timber than any other economic area on the Pacific Coast. They measured dependence on the basis of excess employment -- employment in industries that export outside the area creating a favorable balance of trade. Douglas County had 94.4 percent of excess employment in the timber industry.

The third most important source of income for the county, recreation and tourism, is the most rapidly growing. The Bonneville Power Commission (1967) reported tourist spending totalled $900 million in Oregon as a whole. This figure is projected to increase 12 to 16 percent annually to over $2½ billion by 1985.

Economic research projects a decrease in timber harvests and timber-based employment in the 1970's and later (Maki and others, Research Note PNW 5, Oct. 1969). For Douglas County, the decrease is projected from 3,222 million board feet in the decade of the 1960's to 2,668 million in the 1970's and 2,347 million in the 1980's. Because of increasing efficiency and mechanization, employment in thetimber-based industries will likely drop more than timber harvests. It has, therefore, been projected that the County will lose population from 68.5 thousand in 1960 to 64.1 thousand in 1980.

The most promising "industry" to take up the slack and improve the economic outlook is the recreation-tourist business. The biggest recreation attraction of Douglas County is its sport fishery. Tops for "quality" fishing is fly-fishing for steelhead trout in the North Umpqua River (Fig. 2).

The North Umpqua and Rogue Rivers of southwest Oregon are unique. They drain the vast pumice deposits formed by the volcano that now holds Crater Lake. The porous pumice beds absorb all the water that falls on them, releasing it uniformly, summer and winter, into the rivers. This contrasts with streams such as the South Umpqua that drain the lower Cascades. There, winter rains and snow run off rapidly leaving little water for streamflow through the long, dry summer.

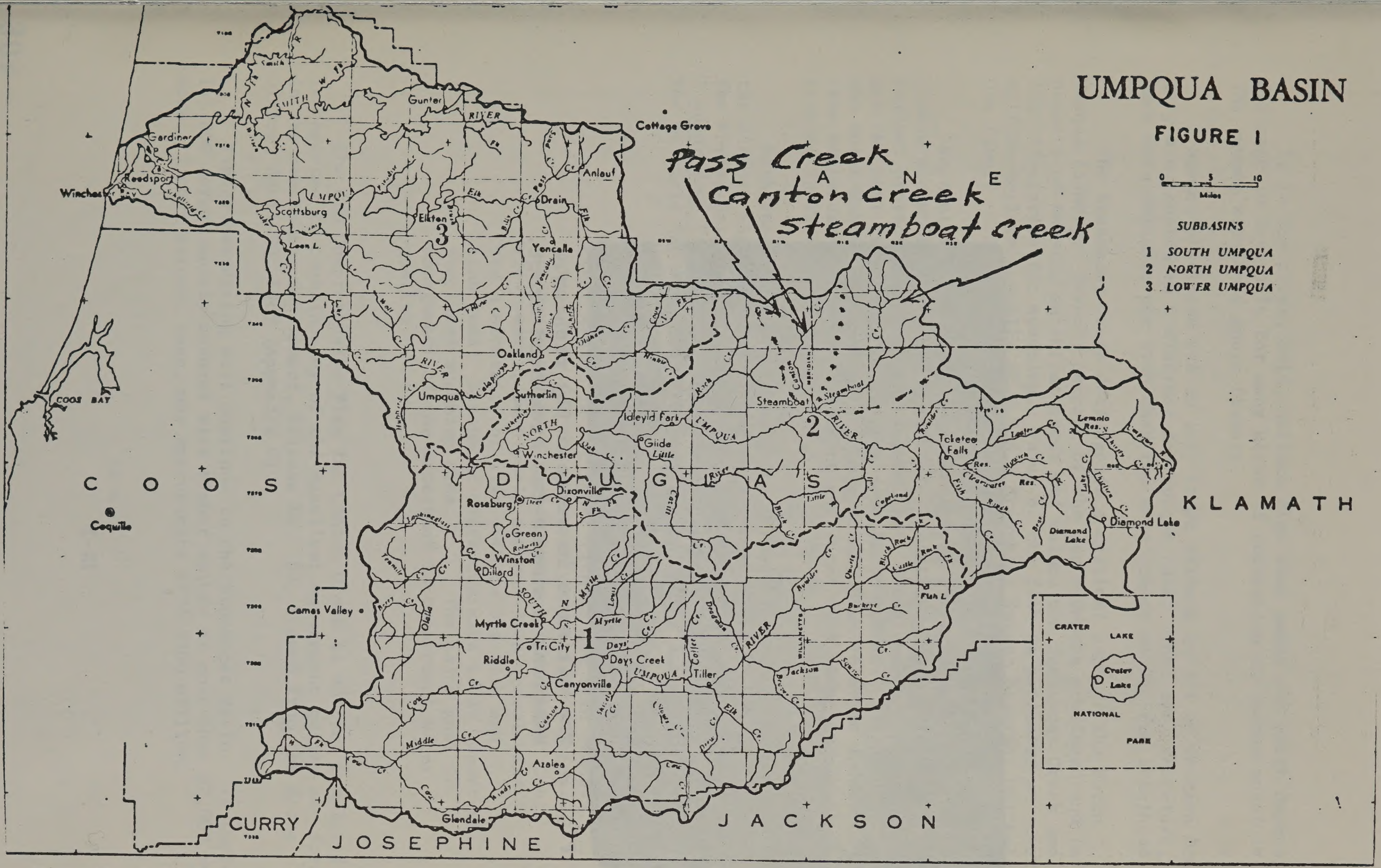


Fig. 1. Douglas County, Oregon, consists of the drainage of the Umpqua River and forms a distinct economic unit with Roseburg as its hub.

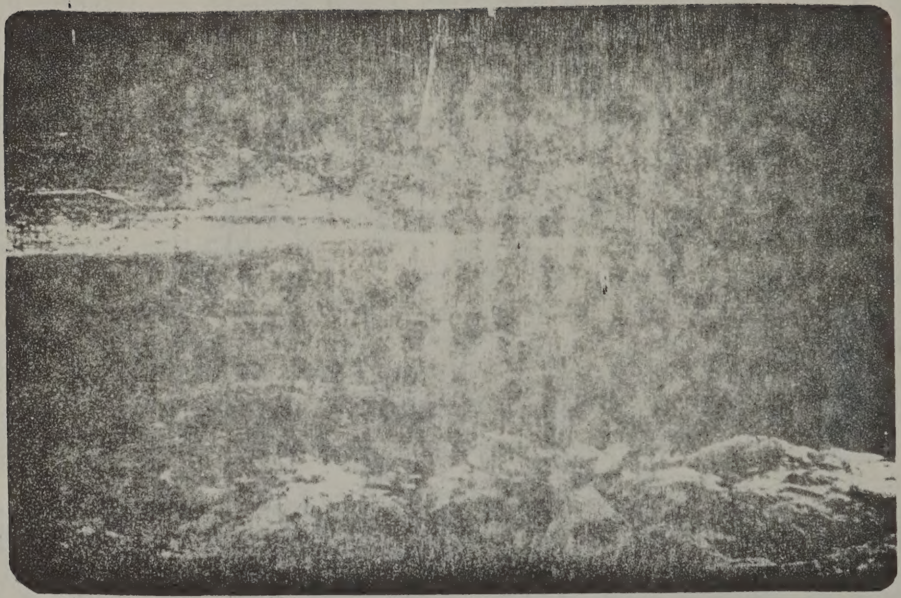


Fig. 2. The ultimate in western fly fishing.
Battling a summer-run steelhead trout.

It is the clear, cold, uniform flow that makes the North Umpqua drainage so desirable for many kinds of recreation and makes possible the summer steelhead sport fishery.

Summer steelhead run in only three streams in all of western Oregon. They are considered a distinct and unique race. They are, therefore, much more valuable per fish than the more common winter-run steelhead.

The Steamboat Creek drainage is a critical part of the North Umpqua fishery. Seventy percent of the North Umpqua steelhead and large numbers of sea-run cutthroat trout and salmon use Steamboat Creek and its tributaries for spawning. Value of the fish is estimated at several million dollars annually (U.S.F.S., Steamboat Ranger District Multiple Use Plan).

Recognizing its importance for spawning, the Oregon Game Commission closed Steamboat Creek and tributaries to all angling in 1932. To further protect juvenile fish during their downstream migration and to get the most in the way of quality recreation out of the steelhead runs, the North Umpqua River itself, from a point about 16 miles downstream from Steamboat Creek, was closed to all forms of angling except fly fishing in 1956.

Both the Forest Service and the Bureau of Land Management accord the fishery high priority in the management of the Steamboat Creek basin. The Forest Service Multiple Use Plan designates it as Management Unit No. 60 - Anadromous Fish Habitat. Special Management instructions apply (Appendix B). The Multiple Use Plan also contains the following statements:

> An important and increasing use of the Umpqua River system is for sport fishing and fish propagation. By far the greatest proportion of recreation use on the district is from fishermen. Cool, clear water, deep pools and mud-free gravel bars are a necessity of life both to the fish and fisherman. Steamboat Creek drainage is an important steelhead spawning area. . . . The major goal in management of the watershed is to protect water quality.

The BLM Comprehensive Plan for Canton Creek is not yet completed. It is expected to contain many of the excellent management guides set forth in the new Manual Supplement, Release No: 83, issued from the State Office, April 30, 1969 (Appendix C).

Timber harvesting will continue in the Steamboat Basin. It includes 145,000 acres, mostly covered with timber valued at more than $2,000 per acre. Timber values, then, may approximate $275-$300 million.

What Happened? When, Where and Under What Circumstances?

Clear cutting of timber in the Steamboat Creek drainage of the North Umpqua River exposed tributaries to direct rays of the sun. Water temperatures increased to levels believed to be marginal for survival of recently hatched steelhead trout, cutthroat trout and chinook salmon that spawn in these waters.

Timber cutting started in a minor way in the drainage as early as 1957. Cutting accelerated with the Bureau of Public Roads building a high quality, surfaced road up main Steamboat Creek for the Forest Service, starting in 1956. That road tapped predominantly national forest lands. Cutting accelerated still further when a road was built up Canton Creek, a main tributary of Steamboat Creek, starting in 1962. That road, built for the Bureau of Land Management by the Bureau of Public Roads crossed intermixed sections of BLM and private lands (Fig. 3). The roads were built to standards specified by the Forest Service and BLM locations determined by the Bureau of Public Roads were subject to change by the land managing agencies. The Forest Service is known to have required one major change to keep the road away from a critical stretch of Steamboat Creek.

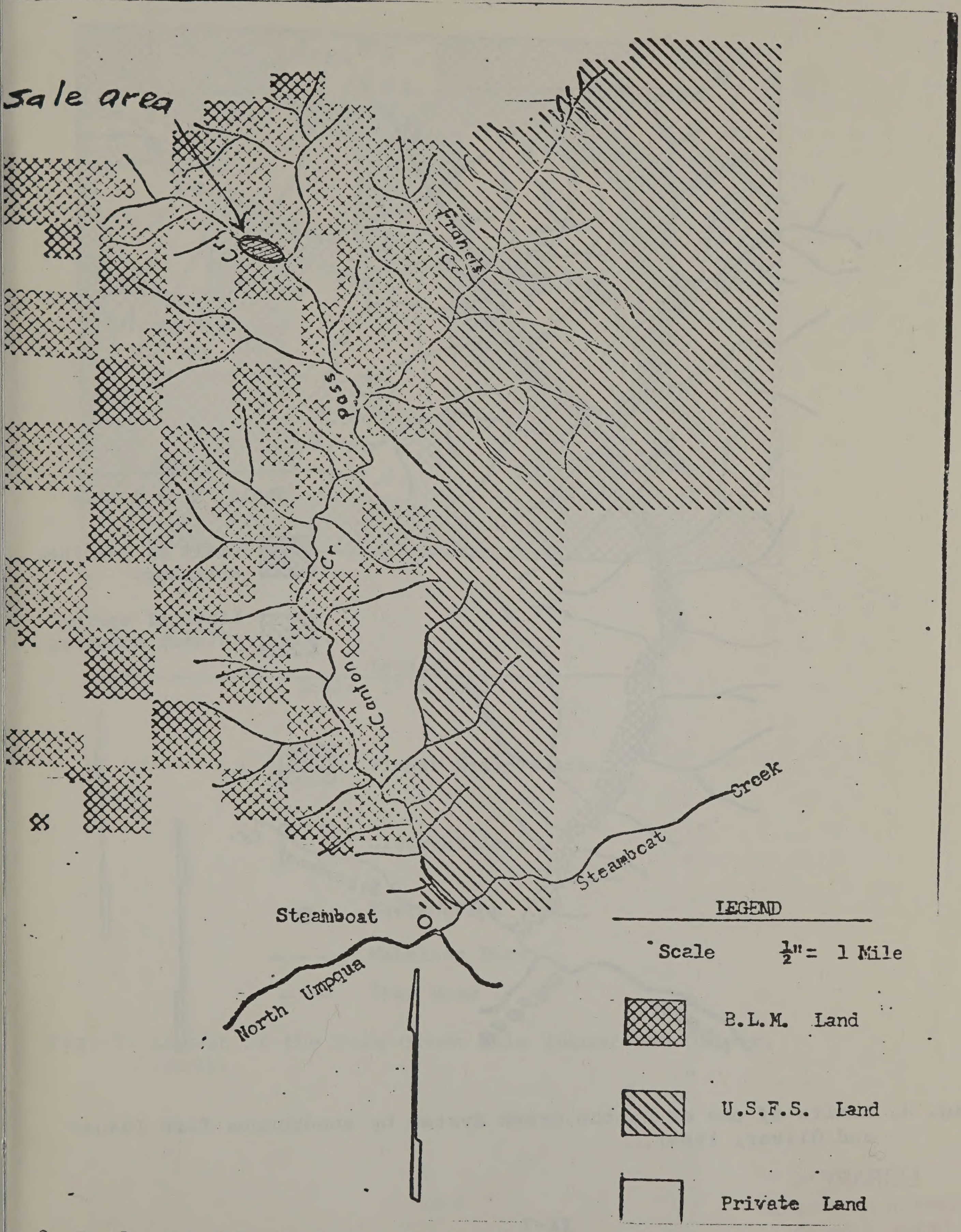
Canton Creek is a primary spawning stream for steelhead trout and salmon (Fig. 4).

Canton Creek and its tributaries total 131 miles of live stream. By 1962, 3.6 miles of stream length had been logged. Clearing of streambanks, mostly on private lands, progressed as follows: by 1965, 8.8 miles; by June, 1968, 19.5 miles; by May 1969, 25.4 miles; or 19.4 percent of the live stream length in the drainage (Table 1).

Frank Moore, proprietor of a fishing resort, Steamboat Lodge, and a key member of "The Steamboaters," an organization of fly fishermen for steelhead, observed fewer adult steelhead entering the spawning streams. He also found water temperatures reaching levels commonly considered to be detrimental to young salmonid fishes (trout and salmon) (Table 2). Although a keen observer, Mr. Moore is not a trained biologist.

Mr. Moore took his findings to the land managers: Forest Service, Bureau of Land Management and major private land owners. He urged that they (1) leave shade along the streams, (2) keep roads away from streams, and (3) keep road widths and cuts as small as practicable.

He was especially concerned about the Pass Creek sale that was being laid out in 1966 by the BLM. The road was surveyed right beside the stream for the full length of the road, 1.5 miles. The four cutting units of 17 to 28 acres each (Fig. 5) were laid out to clear along the stream channel. Planned downhill cable logging risked dragging much of the logging debris into the canyon bottom.



3. Land ownership in Canton Creek drainage (Bauer & Oliver, 1969).

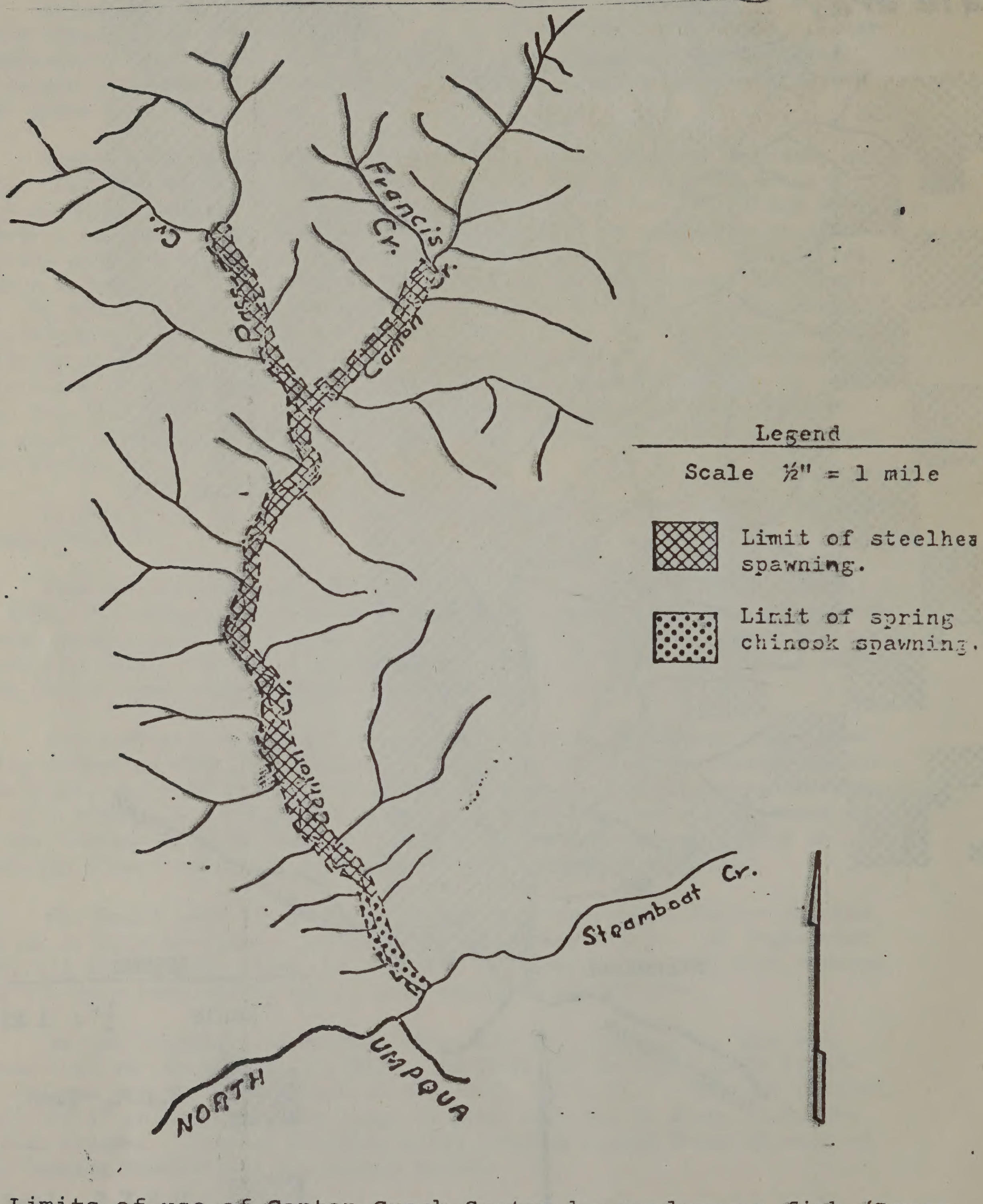


Fig. 4. Limits of use of Canton Creek System by anadromous fish (Bauer and Oliver, 1969).

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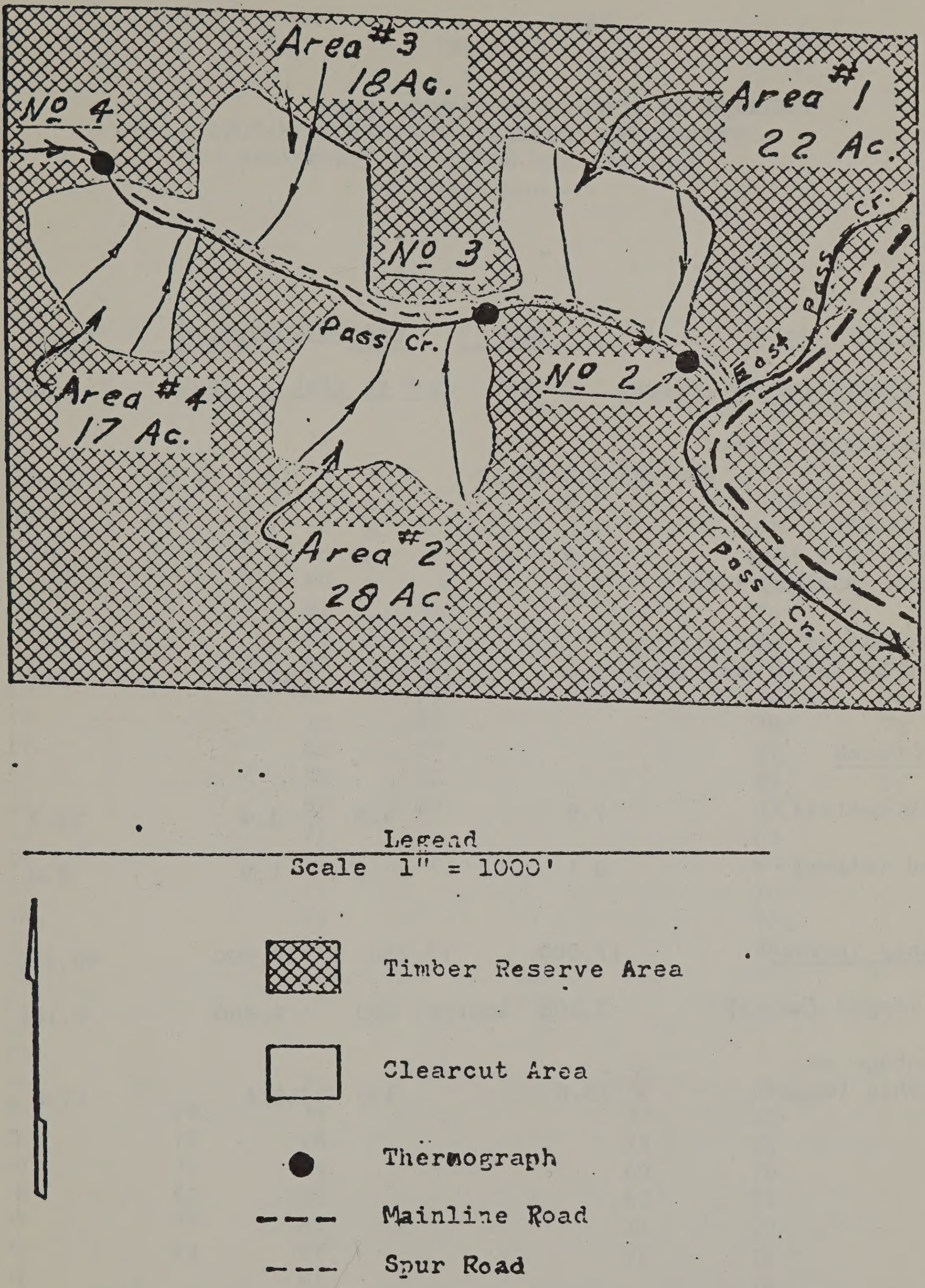

Fig. 5. Layout of the Pass Creek sale (Bauer and Oliver, 1969).

TABLE 1

PROGRESS OF LOGGING ON CANTON CREEK
(Bauer and Oliver, 1969)

ESTIMATED

All Tributaries	BLM	USFS	PRIVATE	TOTAL
1. Live stream length (miles)	68	28	35	131
2. Stream length logged (miles)	7.2 10.6%	0	18.2 52.0%	25.4
Before 1962	1.6	0	2.0	3.6
1963-65	1.0	0	4.2	5.2
1965-June 1968	3.8	0	6.9	10.7
June 1968-May 1969	0.8	0	5.1	5.9
3. Percentage of live stream logged by total ownership	5.4	0	13.9	19.4
Main Canton Creek				
1. Length (miles)	7.0	4.8	3.4	15.2
2. Logged (miles)	0.1	0	1.9	2.0
Area Ownership (acres)	17,000	13,250	10,000	40,250
1. Area logged (acres)	2,208	Approx. 400	4,960	7,168
2. Percentage of ownership logged	13.0	3.0	49.6	17.8

TABLE 2

SPOT MEASUREMENTS OF WATER TEMPERATURES, STEAMBOAT AND CANTON CREEKS, 1968

By Frank Moore

	Steamboat			Canton		
Day	June	July	Aug.	June	July	Aug.
1		74			72	
2		72			71	
3		75			73	
4		78			75	
5		78			76	
6		80			79	
7		81			79	
8		81	75		78	74
9		80	78		76	76
10		80	79		76	76
11		73	81		70	78
12		68	77		67	75
13		68	72		67	67
14		69	69		67	67
15		71			68	
16		71			69	
17		71			70	
18		75			72	
19		71			68	
20						
21						
22						
23						
24		75			73	
25	79	74		77	72	
26	77	78		75	74	
27	71	79		69	76	
28	65	79		62	77	
29	73	80		71	77	
30	73	81		71	78	
31		81			78	

The BLM responded that there was no other practical location for the road and no other practical way to get the timber off these steep slopes. The road was built in 1967, and the logging completed in the spring of 1968.

The Pass Creek sale in itself was too small to have much impact on water temperatures in the primary spawning areas of Canton Creek. But the spectre of Pass Creek multiplied dozens of times haunted the Steamboaters. Enough Pass Creeks could possibly make Canton Creek and Steamboat Creek uninhabitable for salmonid fishes.

In July and August, 1968, the Steamboaters made a very effective movie, "Pass Creek," dramatizing their views -- pointing out the threat to the steelhead fishery of the North Umpqua River. This was followed by a feature story on December 1, 1969, by reporter Paul Pintarich in the NORTHWEST section of the Sunday Portland Oregonian newspaper entitled, "North Umpqua: End of the Steelhead?" The Federation of Fly Fishermen claims responsibility for 25,000 people seeing the film in 12 months starting in September, 1968. (Appendix A)

The combination of film and news article led to strong criticism of all agencies harvesting timber in the Steamboat drainage, especially the BLM. The arguments employed by the Steamboaters and their associates include the following:

(1) Continued removal of shade from Steamboat Creek tributaries will permit summer water temperatures to rise above levels tolerable to steelhead fry. High water temperatures also permit development of "trash" fish which compete with the steelhead fry for food.

(2) Shade cover is slow to regrow in this area. Some cuttings as old as ten years have not regrown sufficiently to provide shade over the stream.

(3) Clear-cutting, especially when accompanied by down-hill logging, tends to move the protective forest litter off the thin soil -- leaving the soil vulnerable to erosion by winter rains.

(4) Soil washed into the streams deposits in and on spawning gravels making them unfit for spawning and smothering the water-inhabiting insects on which the young trout live.

(5) "Overly-engineered" and "overly-built" roads add to the siltation problem, especially when located close to the streams.

(6) Present logging and management practices can lead to unnecessary and possibly irreversible damage to the ecology of the area, destruction of desirable fish species and deterioration of the North Umpqua River water quality.

The Bureau of Land Management responded in part as follows:

(1) There is no positive evidence that the suitability of either Pass Creek or Canton Creek for steelhead has been damaged in any way. The steelhead are still using it. Runs in the North Umpqua have not diminished. (a) ("a" refers to list of confidential sources on p. 38).

(2) Fifty-five percent of a given stream may be logged without harming the steelhead habitat. (b) (Levno & Rothacher, 1967, found that water temperatures were increased significantly on a northwest slope of the H. J. Andrews Experimental Forest only after more than 55 percent of the stream length had been logged.)

(3) We are working with the Oregon State Game Commission, the Fish Commission, and the Forest Service to work out the problems of logging and steelhead. (c)

(4) Stipulations in BLM timber sales contracts call for careful logging practices; . . . roads must be adequate, no equipment or logs dragged through streams and streams cleared of debris after work is done. The **standard** contract for the sale of timber by the BLM reads:

> Sec. 21. Obstructions or pollution of streams, lakes lakes, or reservoirs. The purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If the purchaser's operations under this contract cause the pollution or obstruction of any stream, lake, or reservoir on or near the contract area, the purchaser shall correct the condition to the satisfaction of the authorized officer.

(5) Uphill logging damage is oftentimes as great as that from downhill logging; many times terrain leaves no choice. (c)

(6) BLM has three major considerations: (i) prevention of erosion and subsequent silting of streams, (ii) maintenance of adequate stream temperatures for spawning and (iii) retaining clear passage upstream for fish. (b)

(7) About timber buffer strips: "We must think about the value of the timber along the streams -- the interest rates." (b)

(8) For years we have invited our BLM specialists to study logging methods . . . trying to get loggers and technicians working together. (b)

(9) We have replaced lost spawning gravel at great cost.

(10) We can't just tell the loggers to change methods without showing conclusive results from studies. (c)

(11) We don't have all the answers but we are trying. (d)

Private operators called attention to major differences in road requirements of Forest Service and the BLM. Forest Service roads require less side-hill cutting thereby allowing (upon proper compaction and suitability of excavated materials) inclusion of both cut and fill surfaces in the road bed. BLM requires sufficient cut to build the entire traffic surface within the original slope. No traffic surface is permitted on fill material; this is called the "full-bank" requirement. Forest Service can approve moving slope stakes to fit the terrain upon request of the contractor; BLM allows no changes. (f), (g), (h) (Fig. 6)

ENVIRONMENTAL IMPACTS

Clearcutting, even of the moderate-sized, staggered settings used at Pass Creek, has many impacts of varying degrees.

I. Air quality is unaffected except when logging slash is burned. Slash burned under appropriate atmospheric conditions as far from population centers as these should have no significant impact. Impacts of burning logging slash on air quality, and means of minimizing impacts are well documented. (2)

II. Wildlife habitat in the Northwest is commonly improved by scattered clearcutting. The dense forests produce little forage (Fig. 7). Cut areas produce more. Deer, mountain quail and cottontails find them hospitable.

III. Wilderness values were not at stake in this area.

IV. Vegetative patterns and scenic resources deteriorated at least temporarily (Figs. 8, 9). The cuttings were geometrically shaped; they do not harmonize in any way with the topography. The near view at present is a bleak hillside cluttered with blackened stumps and logs. This view will improve as the slope reforests. It should have the appearance of a forest again in 10 to 20 years.

The vegetative pattern imposed upon the slopes will be there for at least a tree generation. Subsequent cuttings may be shaped to develop a more pleasing future pattern. The Forest Service is already employing landscape architects to attain that objective.

The esthetics of the distant view will depend greatly on the vegetative patterns produced by future cuttings. The distant view is not critical in this area, however. The lower slopes of Pass Creek are in such a narrow canyon that they are not visible from a distance. They are also on a relatively remote spur road which should receive little recreation use except for hunting.

V. General ecological changes can be illustrated by clear-cutting's marked influence on the ecology of a site. In the final analysis, only removal of the old forest permits a new one to start. The changes are not all advantageous, however. "Letting the sunshine in" makes it possible

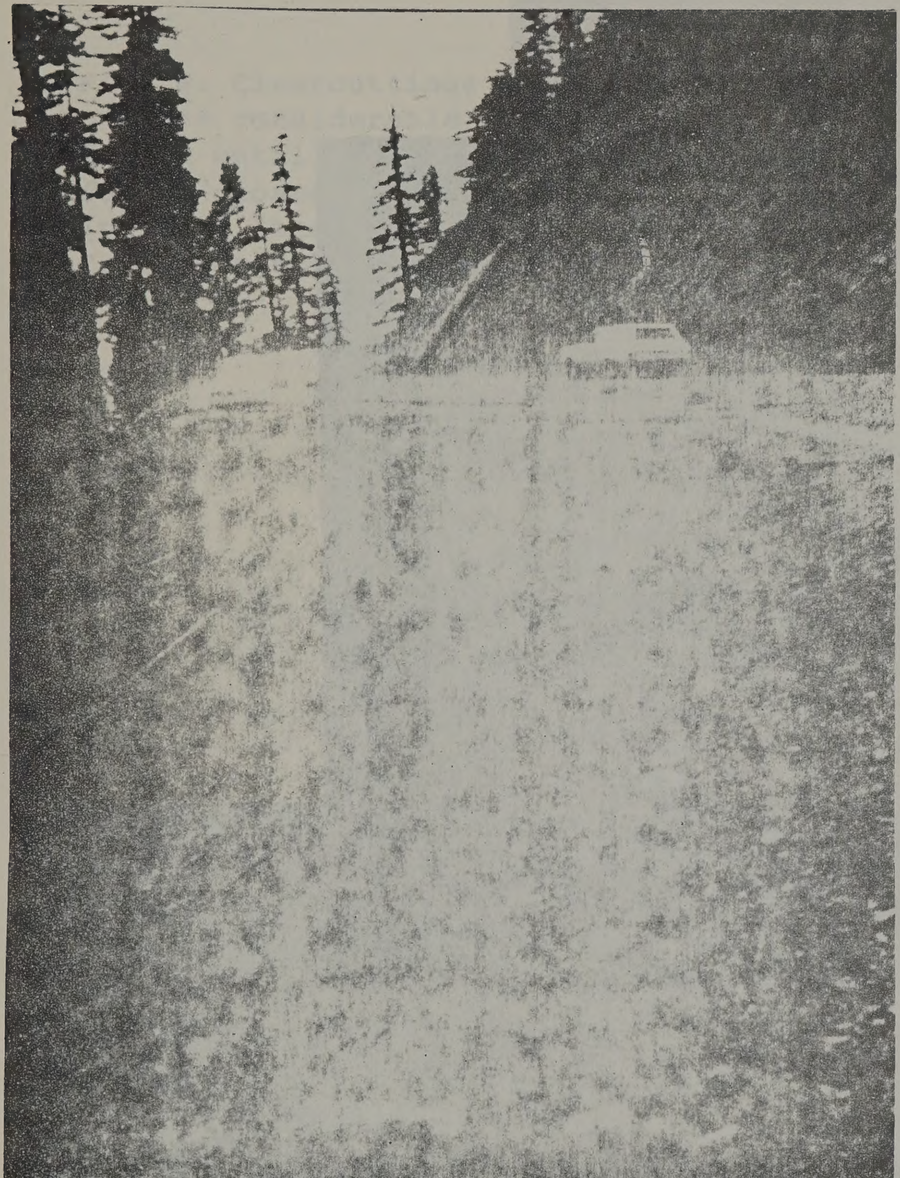

Fig. 6. BLM's Francis Creek Road.

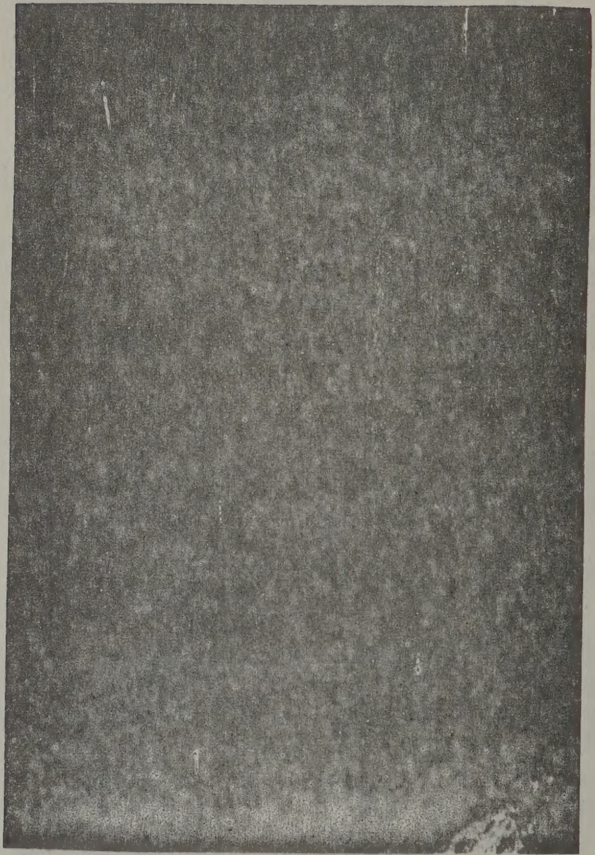

Fig. 7. There is little forage under the dense timber of Pass Creek.

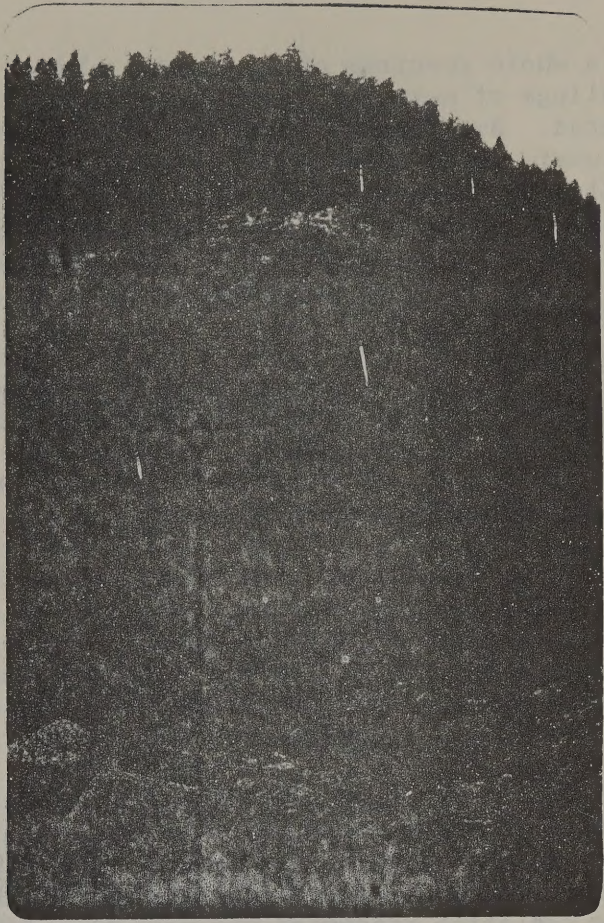

Fig. 8. Clearcuttings produce considerable forage until the new forest closes over it (private land along Canton Creek).

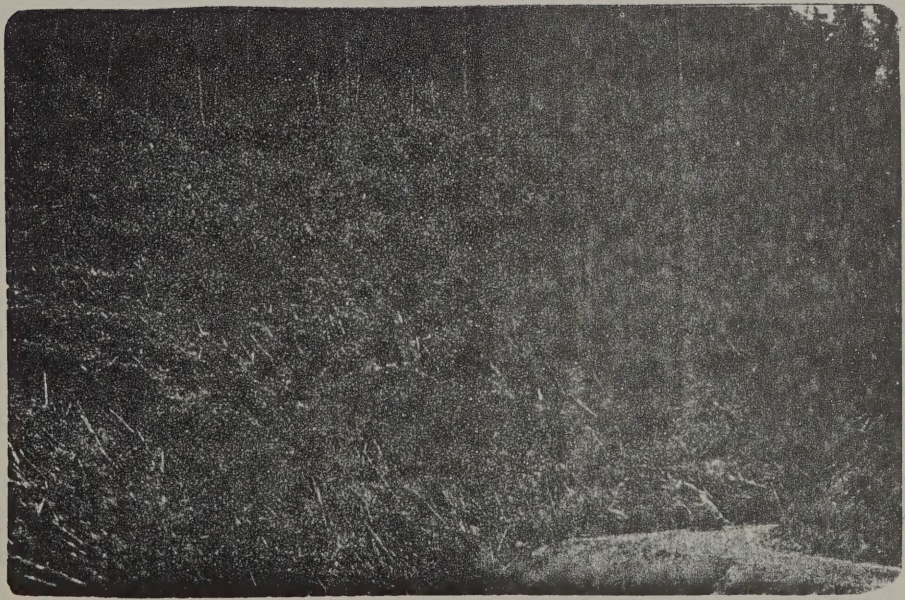

Fig. 9. Considerable logging debris is dragged to the base of the slope by downhill cable logging.

for a whole spectrum of sun-loving plants to get started. That includes seedlings of most important forest trees, including those that may be planted. But responses are not all favorable. Unfavorable responses include: rapid invasion of the site by plants that compete with tree seedlings; increased numbers of tree-seed eating rodents, including deer mice and chipmunks; increased numbers of pocket gophers and meadow mice that destroy tree seedlings. This succession of events often means that the forest must be reproduced promptly or reproduction may become difficult and uncertain.

VI. Water quality and aquatic environment were the major impacts that led to the Pass Creek controversy. They affected a major recreation resource of the whole Umpqua drainage, the sport fishery, as well as the commercial salmon fishery in the Pacific Ocean. Several valid detrimental impacts have been documented.

Water temperatures of Pass Creek increased on the average, by 6° to 8° F. while flowing through 1,290 feet of channel exposed to the sun in cutting areas 2 and 4 (Fig. 5). The highest water temperature measured at thermograph No. 4, located above all cutting, was only 58°. The highest measured at thermograph No. 3, located at the downstream edge of Area 2 (Fig. 5), 3,585 feet below thermograph 4, was 66°.

Dr. George W. Brown, Oregon State University, determined that the temperature change between two points on a stream is directly proportional to the surface area of the stream and the heat load applied between two points. It is inversely proportional to the volume of stream flow. Solar radiation accounted for more than 95% of the "heat load" during midday in the summer. When applied to Pass Creek, for August, 1969, Dr. Brown's equation predicted an 8° rise in temperature from thermograph 4 to thermograph 2. "The eight degree predicted increase when added to temperatures recorded at station No. 4 were very close to the temperatures measured at station No. 3." (1)

The rise in temperature to as much as 66° at thermograph station 3 is not important in itself. When added to the temperature rises expected in the 25.4 miles of stream length logged in the Canton Creek basin, it starts to become important. Frank Moore measured temperatures as high as 79° on three different dates in 1968, and temperatures of 77° or more on 15 dates. These were spot measurements, not necessarily maxima (Table 2). A team of investigators found lower temperatures in 1969 when the highest water temperature measured (starting July 24) was 75.5° F. (Table 3). It was said that 1969 was a relatively cool year, however. This is born out by air temperatures measured at Idleyld Park, about 15 miles downstream from Steamboat (Table 4).

The Bureau of Land Management pointed out: there is no evidence that these temperatures are harmful to steelhead trout; the steelhead are still spawning in Canton Creek; steelhead runs in the North Umpqua are increasing.

It is true that the temperature tolerances of steelhead have never been determined. It is also possible that the North Umpqua race of summer steelhead may have higher temperature tolerances than other races of the

TABLE 3

CANTON CREEK TEMPERATURES (^{o}F)
Station 2

Date	June			July			August			September		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
1							71.0	60.5	65.0	69.5	60.0	64.3
2							70.0	60.0	64.3	69.0	61.0	64.1
3							69.0	59.5	63.8	65.5	59.0	61.4
4							63.0	59.0	61.5	64.0	56.0	59.3
5							67.5	56.0	61.2	63.5	55.0	58.8
6							68.0	57.5	62.4	64.5	55.0	59.6
7							68.0	58.0	62.8	66.0	57.0	61.4
8							69.5	59.0	63.8	67.5	61.0	63.8
9							70.0	60.0	64.8	67.5	60.0	62.3
10							71.0	61.0	63.4	68.0	60.0	64.0
11							67.5	61.0	63.6	68.0	61.0	64.2
12							69.0	59.5	63.8	68.0	61.0	63.8
13							70.0	60.5	65.1	64.0	58.5	62.9
14							72.0	62.0	66.9	62.5	55.5	58.0
15							71.0	63.0	66.1	62.0	54.0	57.7
16							70.0	61.0	64.6	61.5	56.0	58.8
17							69.5	60.0	64.3	59.0	57.5	58.4
18							70.0	61.0	64.9	60.0	57.5	58.9
19							70.5	62.5	65.7	58.0	57.5	57.9
20							71.0	61.0	65.7	60.0	57.0	58.4
21							72.0	62.0	66.4	61.0	57.5	59.0
22							72.0	62.5	66.9	60.5	57.0	58.6
23							72.0	63.0	67.2	58.0	56.5	57.6
24				71.0	68.0	69.7	70.0	63.0	65.3	60.0	55.5	57.7
25				75.0	66.0	69.6	69.0	60.0	63.8	62.5	57.0	59.7
26				75.0	63.0	61.2	67.5	60.0	63.3	63.0	58.0	59.9
27				75.5	65.5	70.0	68.6	61.0	63.8	61.5	56.0	58.6
28				73.0	65.0	69.5	66.0	60.0	62.2	62.5	56.5	59.1
29				72.0	65.0	67.4	66.0	57.0	60.9	61.0	57.0	58.8
30				71.5	61.5	66.4	66.5	58.0	61.6	58.0	56.5	57.6
31				71.0	61.0	66.0	68.0	58.0	62.8			

July		August		September	
Monthly Max.	75.5	Max.	72.0	Max.	69.
Monthly Min.	61.0	Min.	56.0	Min.	54.
Max. Daily Fluct.	12.0	Max. Daily Fluct.	11.5	Max. Daily Fluct.	9.

TABLE 4

MONTHLY MEAN AND MEAN MAXIMUM TEMPERATURES
IDLEYLD PARK, OREGON
(U.S. Weather Bureau)

Year	June	July	August	September
	°F.	°F.	°F.	°F.
		Means		
1967	63.3	66.8	70.3	65.2
1968	61.7	67.1	65.2	60.2
1969	63.0	63.9	63.8	61.7
		Mean Maxima		
1967	78.7	85.2	91.5	82.9
1968	76.9	84.5		73.1
1969	74.6	80.1	81.7	77.1

species. Dr. James D. Hall, Department of Fisheries and Wildlife, Oregon State University, and leader of the O.S.U. project studying impacts of logging on anadromous fishes, reports that he considers water temperatures measured recently in the Steamboat drainage to be "marginal" for steelhead.

Levno and Rothacher investigated water temperature changes that accompanied logging of two small watersheds on a northwest slope in the McKenzie River drainage, Cascade Mountains, Oregon. They found significant rises in temperature only after 55% of the stream length had been logged.

The most comprehensive studies to be undertaken on the effects of logging on anadromous fish habitat are in progress by Oregon State University and cooperators om tributaries of the Alsea River (9). Key findings include:

(1) Clear-cutting about 30% of a watershed in 3 units that did not remove shade from the live stream had no effect on water temperatures;
(2) Clear-cutting completely a small drainage resulted in drastic temperature increases. In 6 years of records before logging, the highest temperature measured was 16.1°C. (61°F.). In 1966, the year logged, water temperatures rose to 24°C. (75°F.) and in 1967 to 30°C. (86°F.).

These temperatures have different significance for different species of fish. Coho salmon are killed if exposed to a constant 77°F. too long but will survive higher temperatures over shorter periods (9). Temperature tolerances of other salmonids are not known. Dace, undesirable competitors of juvenile salmonids, thrive under higher temperatures.
(3) High water temperatures dropped about 3°C. in passing through 200 meters of shaded channel.
(4) Fish survived these extreme temperatures in the stream.
(5) A rapid rise in temperature from 13°C. to at least 28°C. during slash burning killed some fish.
(6) Dissolved oxygen in the water was reduced. This was noticed first in the intragravel water after felling started along the stream. A layer of debris on the gravel and ponding of the surface water caused a decrease in rate of interchange between surface and intragravel water. This decrease, coupled with the oxygen demand from the decomposing debris, caused a rapid decline in dissolved oxygen in the intragravel water (Table 5). The 1.3 mg/l measured June 30 is too low to support either living fish eggs or fry.

Dissolved oxygen also declined drastically in the surface waters. In one stretch of the logged streams, ". . . dissolved oxygen levels in most of this area were too low to support salmon and trout in late June and through most of July. Juvenile Coho salmon placed in live boxes there survived less than 40 minutes."

Dissolved oxygen increased when the logging debris was removed from the water in September and improved further after fall freshets. Intragravel dissolved oxygen has continued to remain low, however, through the subsequent two years.

TABLE 5

Intragravel dissolved oxygen levels (mg/l) from eight standpipes in the clearcut watershed (Needle Branch) and from six standpipes in the control watershed (Flynn Creek) on three dates during the logging operation in 1966.

	Needle Branch		Flynn Creek	
Date	Mean	Range	Mean	Range
April 19	10.7	7.0-12.0	10.2	7.7-11.8
May 30	4.2	2.4- 7.3	9.0	6.8-10.8
June 30	1.3	0.5- 2.2	7.2	4.0-9.1

(7) Sediment load in Needle Branch increased 3 to 4 times during storm periods. Sediments reduce the interchange of oxygen between surface and intragravel waters and impede emergence of fry from the gravel.

(8) "It seems clear that most watersheds subject to logging can re-establish favorable conditions for fish production, if adequate attention is given to stream protection and channel clearance."

The branch of Pass Creek in which the cuttings were made (Fig. 3) is not known to be used for spawning (Fig. 4). Logging debris was removed from the channel and the channel restored to approximately pre-logging conditions (Fig. 10), after logging was completed.

Siltation of gravels cannot be determined by inspection. The gravels of Pass Creek looked clean. Erosion from the areas logged and from the road did not appear to be excessive. This was born out by a visit to Pass Creek on December 21, in heavy rain, when the streams were in near-flood stage. Runoff from the logging units was heavy (Fig. 11). Mud flows were coming off some of the clear-cutting on private lands (Fig. 12). Pass Creek was high but its waters were essentially clear (Fig. 13).

Increased growth of algae was noted in Pass Creek. This accompanies increased water temperatures, increased sunlight and increased plant nutrients washed from the cut and burned slopes.

Increased stream temperature is a fundamental change in the aquatic environment. Its full significance has not been reported, but some things are known: oxygen-holding capacity of the waters is reduced; "trash" fish, that have high temperature tolerances and which compete with the salmonid fry for food are favored; metabolic rates and maintenance requirements increase; pathogenic organisms become more active; impact on water-inhabiting insects is not known.

Other influences lend special importance to the small feeder streams.

(1) They can have a cooling effect on the waters of the larger streams;

(2) Steelhead and Coho salmon are secretive, they spread out into unbelievably small streams to spawn;

(3) Juvenile steelhead survive better in small streams where they remain up to two years. They offer appropriate food and escape shelter. It is best to keep these streams reasonably clear during periods of run-off.

The ultimate measure of the effects of logging on a fishery is the response of fish populations to habitat changes. In the Alsea study, following clearance of the stream channel in the logged watershed (Needle Branch), adult Coho salmon have spawned in numbers approximating those before logging. The number of juvenile Coho migrating to the ocean in the two years since logging has been within the range of variation recorded before logging. Numbers of resident cutthroat trout have dropped to about one-quarter pre-logging numbers. (9)

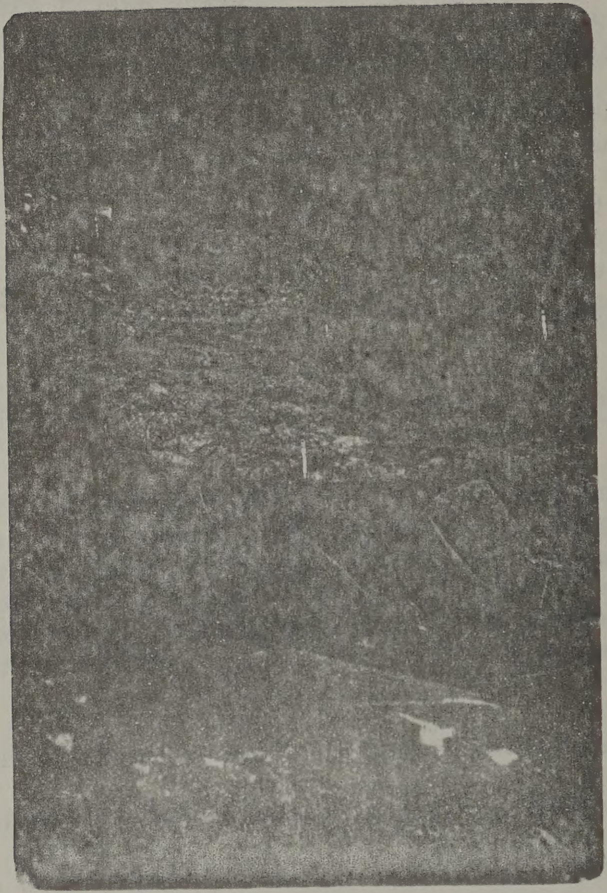

Fig. 10. Pass Creek channel was cleared out after logging and restored to approximately prelogging condition.

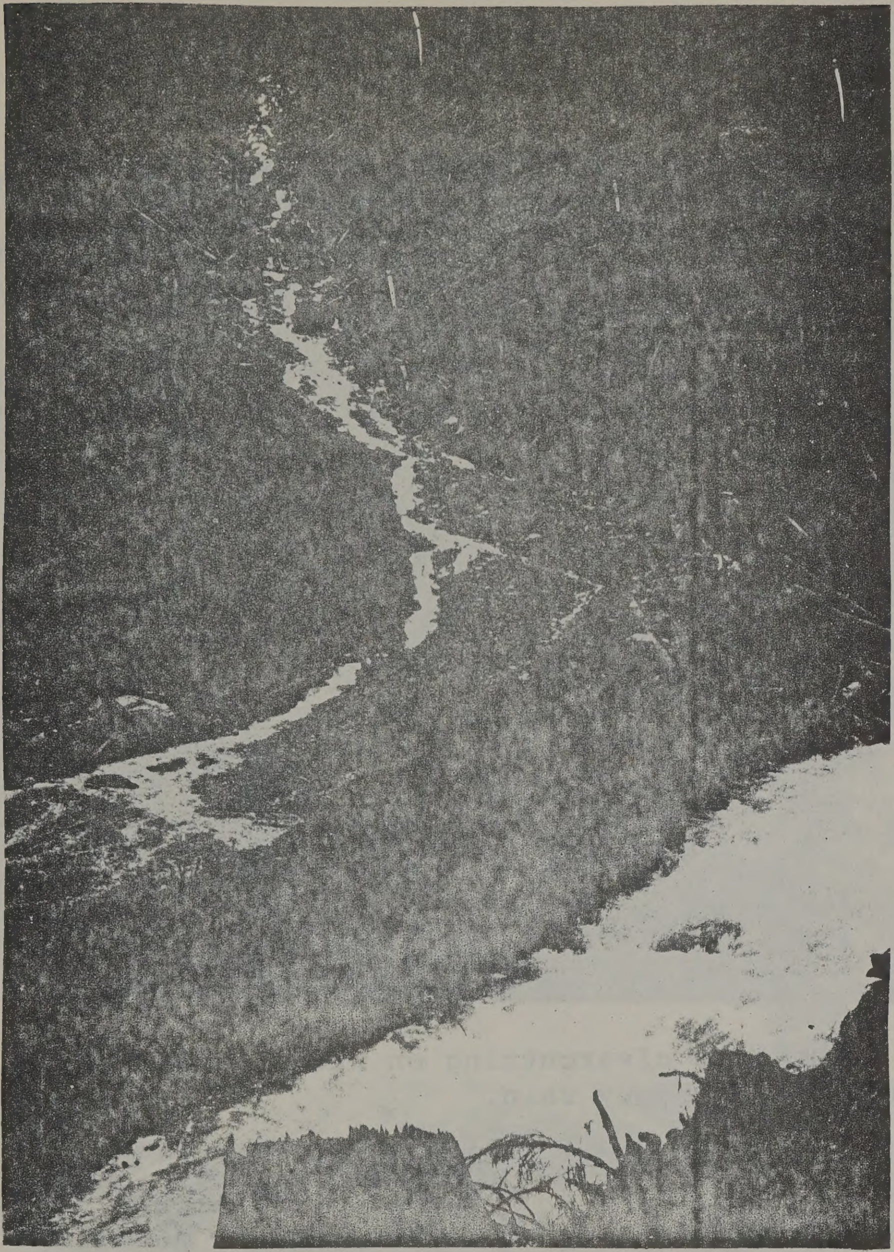

Fig. 12. Mud flowed from large clearcutting on steep slopes on private lands during heavy rain.

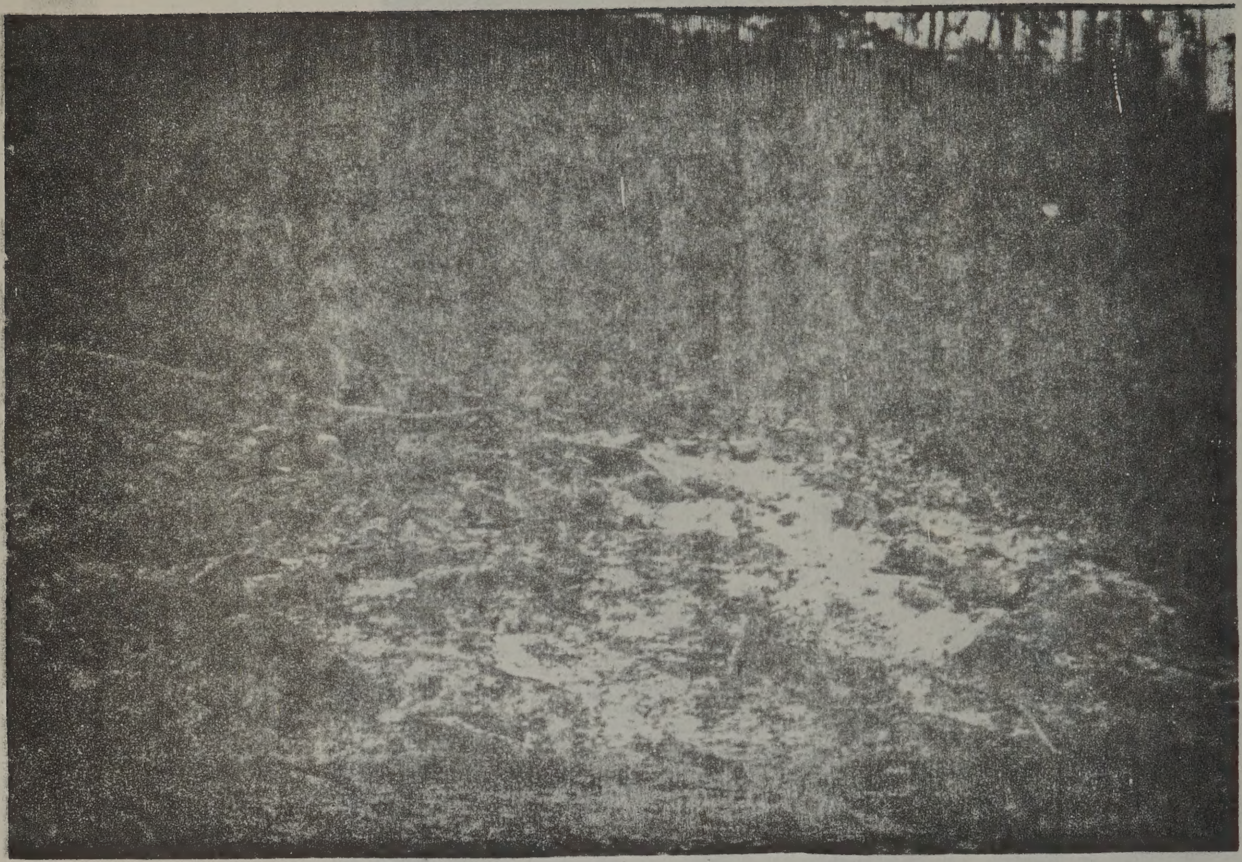

Fig. 12. Mud flowed from large clearcutting on steep slopes on private lands during heavy rain.

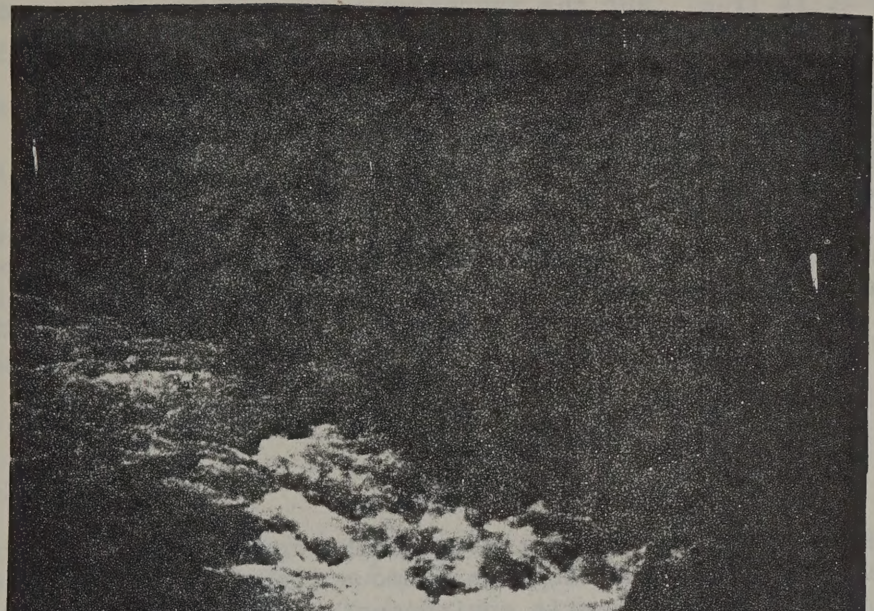

Fig. 13. Pass Creek flowed high, but essentially clear during heavy storm.

Frank Moore reported for the Steamboat Creek area "where several years ago I could count hundreds of steelhead in the spawning streams, lately I can find only scattered dozens." (12)

BLM officials (a) pointed out, however, that runs in the North Umpqua are increasing. That is true. But the increases are a result of planted fish. Runs of "wild" fish have declined.

If the State Game Commission counts over the past 24 years are divided into two groups of 12 years, the average run of wild steelhead was 3,174 fish annually for the period 1945 to 1957 and 2,406 fish annually for the period 1958-1969 (Table 6).

The success of the hatchery program indicates that it may be possible to preserve the steelhead runs even if the spawning streams are damaged. Natural production is much less expensive, however, and fishermen claim the wild fish are much more sporting.

PROBLEM ORIGINS

The problem arose from harvesting timber along streams critical for the spawning of steelhead trout and other anadromous fish without sufficient regard for water quality and the aquatic environment. The U.S. Bureau of Land Management, U.S. Forest Service and private land owners are involved.

The economy of the area is dependent on timber. The method of harvesting, clearcutting in staggered blocks, is silviculturally sound for old-growth Douglas-fir. It has been used for many generations in appropriate timber types in Europe.

Both public agencies are authorized and directed to sell timber: For BLM, ". . . such portions of the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands which have heretofore or may hereafter be classified as timberlands, and power-site lands valuable for timber, shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities." (Code of Federal Regulations Title 43, Chapter 28, Section 1181a) (Appendix E). BLM also interprets the above as broad authorization to manage timbered lands for multiple use.

For the Forest Service, "one of the prime objectives of national forest management is to develop an orderly program of timber sales designed to obtain the regular harvest of national forest timber at allowable cutting rates as determined by timber management plans . . ." (Code of Federal Regulations, Title 36, Chapter II, Section 221.6) (Interprets or applies 74 Stat. 215, 16 U.S.C. 528-531) (28 FR 723, Jan. 26, 1963). (Appendix F).

TABLE 6

Annual counts of summer steelhead that passed over Winchester Dam, North Umpqua River (Oregon State Game Commission)

Year	Wild	Hatchery	Total
1946	3,361		3,361
1947	5,113		5,113
1948	2,762		2,762
1949	1,672		1,672
1950	2,835		2,835
1951	3,361		3,361
1952	4,443		4,443
1953	2,844		2,844
1954	3,117		3,117
1955	3,430		3,430
1956	2,927		2,927
1957	2,228		2,228
1946-57 Totals	38,093		38,093
1946-57 Averages	3,174		3,174
1958	2,041		2,041
1959	1,356	693	2,049
1960	1,782	950	2,732
1961	2,473	704	3,131
1962	1,755	1,317	3,072
1963	2,907	1,920	4,827
1964	2,340	560	2,900
1965	3,445	1,983	5,428
1966	3,139	3,046	6,185
1967	2,160	2,658	4,818
1968	1,430	3,748	5,178
1969	4,084	10,847	14,931
1958-69 Totals	28,876	28,426	57,292
1958-69 Averages	2,406		4,774

Policy of the Congress toward multiple use was clarified in the Multiple Use Sustained Yield Act of June 12, 1960 (74 Stat. 215; 16 U.S.C. 528-531). Sec. 1:

> It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.
>
> * * *
>
> Sec. 4. As used in this Act, the following terms shall have the following meanings:
>
> (a) 'Multiple use' means the management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions;

The private lands are held by companies in the timber industry. The lands are held for the growing and harvesting of timber. The private operations are controlled by two sets of legislation, the Oregon Forest Practices Act and the Water Quality Standards set by the State Department of Environmental Quality under Oregon Revised Statutes, Chap. 449.

The Oregon Forest Practices Act sets standards and practices for regenerating the forest and reducing fire hazards. It is enforced by the State Forester. For safeguarding aquatic environments, it is not effective.

The Oregon Water Quality Standards are stringent and, if enforced, could adequately protect water quality and fish environment. The general Water Quality Standards that apply to all waters of the state specify that no wastes shall be discharged and no activities shall be conducted (emphasis added) that will cause the dissolved oxygen content of surface waters to be less than six milligrams per liter, now which will cause any measurable increase in temperature when the receiving water temperatures are 64°F. or above, or more than 2°F. when receiving water temperatures are 62°F. or less. It further prohibits activities that will create deposits, organic or inorganic, that will be deleterious to fish or other aquatic life (Oregon Administrative Rules, Chapter 334, Div. 1, Sec. 11-025 as adopted by State Sanitary Authority, June 1, 1967). (Appendix H)

In short, laws are adequate to protect the aquatic environment. Failure comes in practice. The following are believed to be contributing factors:

1. Demands for timber on these lands have long exceeded demands for recreation-oriented activities.
2. As a result of such disparate demands, funds allotted the public agencies were primarily earmarked for roads and timber harvesting activities.
3. Staffs trained and motivated primarily for timber harvesting and management were developed.
4. Government economy moves in recent years have forced the public agencies to operate short-handed and under-financed. As one Forest Service official (e) stated, "If the Forest is pushed to get the necessary amount of timber out, with funds that are barely adequate, some multiple use items may be short-changed a bit. The desire is to consider all uses thoroughly, but where funds grow short, the non-financed activities are the first to be short-changed."

Douglas County remained economically remote until World War II. Its forests were used primarily for dispersed recreation by few people. There were few roads into them. Forest Service and BLM activities were confined largely to protection. A boom in demand for timber attended the economic coming-of-age after World War II. The public agencies appropriated funds to make timber available. Foresters and engineers were employed. Roads were planned and built and timber harvested in a fever of activity in the woods.

The superlative characteristics of the North Umpqua were not widely appreciated outside the local area until the modern highway was completed along it in the late 1950's. At that point the public demand for other services (recreation, scenery, quality fishing, camping, quality water) started growing.

The demands were felt first by the Forest Service. The national forests included the higher elevation lands that are most favorable for outdoor recreation. The Forest Service responded to a considerable degree. It has complete multiple use plans for every ranger district. The M.U. plan for the Steamboat District recognizes the importance of the Steamboat Creek drainage for anadromous fish and places it in a separate management unit #60, "Anadromous Fish Habitat," for which special management rules apply (Appendix B). For streams with active spawning grounds no equipment will be operated in the streams, streamside vegetation will not be removed, streamside shade will be preserved and debris barriers will be removed (Appendix B).

The demand on BLM lands apparently came later. The manual supplement prepared "to provide State policy and guidelines for the protection of streams during all timber management activities," (Appendix C) was dated April 30, 1969. It is probably an outgrowth of the Pass Creek publicity. The manual supplement contains this statement: "Although BLM land management programs in the past have given significant attention to the conservation of soil and water, increased emphasis of the preservation of fish habitat and water quality demands drastic further changes in attitude and approach." Emphasis added)

The BLM management plan for the Canton Creek drainage is still in preparation.

The State Water Quality Standards are considered, by all people we talked to, too stringent to be enforceable.

The larger timber-based industries recognize the value of favorable publicity and the damage caused by unfavorable publicity. They are inclined to cooperate in trying to protect public values.

At first glance, Pass Creek is a controversy between sportsmen and loggers and foresters. It goes deeper. The sportsmen represent the whole outdoor-recreation public plus those who have become concerned about the general deterioration of environment.

ENVIRONMENTAL CONSIDERATIONS

Kinds of Considerations

It appears that economics and engineering feasibility dominated decisions made by BLM and private operators regarding Canton Creek and Pass Creek. The Oregon Game Commission was consulted before road building ever started in Steamboat and Canton Creek. Their requests backed by the Roseburg Rod and Gun Club produced some changes in main road locations. These roads are not contributing substantially to the problem.

As the Pass Creek Sale was small and routine, no special studies hearings or investigations were conducted.

No special precautions appear to have been taken. Entreaties by the Steamboaters to modify the road and its location and to keep shade on the stream were ignored.

The logging contractor (f) who built the road up nearby Francis Creek for the BLM complained that his request to move the road location away from the stream had to go all the way to the Washington office for approval. The width was also modified from 19 to 14 feet only after similar difficulties. Side cast rock material reached the stream in at least two places.

After logging was completed, however, debris was removed from the creek, temporary bridges and culverts were removed, and the stream channel was restored to approximately its pre-logging condition except for shade (Fig. 10) and places where the road crowded the channel (Fig. 14). Although this is standard practice, adverse publicity may have stimulated a more-complete-than-usual job.

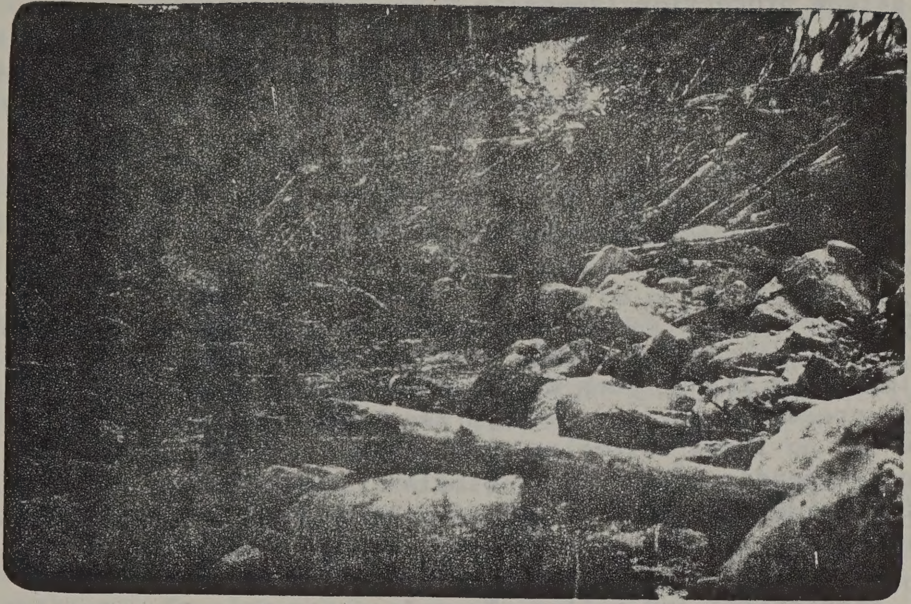

Fig. 14. Here road cut material was sidecast directly into the bed of Pass Creek.

Since Pass Creek was logged, BLM and others have undertaken several important steps which indicate an awakened awareness of the need to consider the aquatic environment in future timber harvesting activities. The adverse publicity over Pass Creek undoubtedly stimulated these specific actions:

1. Cooperative studies of the relation of timber harvest to water temperatures and fish habitat were started in the Steamboat Creek drainage. Cooperators include Bureau of Land Management, Oregon State Game Commission, Umpqua National Forest, Oregon State University and Douglas County Water Resources Board (1).

2. The State Office, Bureau of Land Management, issued the manual supplement on stream protection (Appendix C).

3. BLM on December 12, 1969, announced hiring of six fishery biologists, four soil scientists and a forest hydrologist for service in Western Oregon (Appendix D).

Alternatives

The Steamboaters (Frank Moore, personal discussion) and fisheries biologists (9) agree with timber people that Steamboat Creek basin can support both timber and fish. Such multiple use will require only a few modifications in present practices -- such as those contained in Appendices B and C. There are no legal obstacles to the BLM or Forest Service following these procedures (Appendices E, F, G). Similarly, compliance with Oregon Water Quality Standards (Appendix H) only requires modifications in practice by privateoperators.

But laws, regulations and policy alone do not assure practical compliance. The steps needed (within the framework of existing laws) are three:

1. Recognize the problem. This has been done by BLM (Appendix C), Forest Service (Appendix B) and State of Oregon (Appendix H). Officers of the two of the larger private operators on the area have also demonstrated an awareness and willingness to cooperate (U.S. Plywood and Bohemia Lumber Co.).

2. Make policy explicit. This has now been done by the two federal agencies and the State (Appendix B, C, H).

3. Implement policy in the field. This is the step in which future failures can occur.

We believe that proper consideration of the aquatic environment in Steamboat Creek basin by the federal agencies is now reasonably assured by

Forest Service Multiple Use Plan (Appendix B), by BLM's Management Plan for Canton Creek drainage that is being prepared, by the cooperative studies in progress (1), by public sentiments and by increasing agency sensitivity to public desires. As public sentiment for better environmental management grows and criticism of unacceptable performance continues to grow, the performance of the public agencies will improve.

Alternatives and courses of action that may help the situation both in the Steamboat Basin and elsewhere are:

1. Public opinions, pressures and demands should guide the public agencies under present laws. This is what is now happening. It has produced much progress. The effectiveness of this procedure might be strengthened by wider use of broadly constituted advisory committees to State and Regional Offices, or closer consultation and cooperation with other agencies such as the State Game Commission.

2. Funds should be allotted to the public agencies for environmental protection and management. Most funds now received are designated for specific uses as timber management, range management, etc. Increases are nearly always allotted for specific purposes. When a biologist is employed by the Forest Service, for example, he has to be paid from "project" funds, such as timber funds, range funds, road and trail funds, in proportion to the time he spends on each activity. When funds grow short, he is likely to be the first to be released. To assure that environment receives the same emphasis as other products and activities, it should be financed "project."

3. Funds should be allocated for road development. Road funds have never been adequate to build all the timber access roads needed. Consequently, road construction is part of many timber sale contracts and is financed out of timber values. Financing road construction often necessitates heavy cutting. It also means that the location is often determined largely by timber harvesting needs. Once in, the road becomes a multi-purpose road. Yet, timber pays the bill. If separate funds could be used, roads would receive more multi-use consideration in planning and leave greater flexibility to consider other values in timber sales.

4. New legislation should require monitoring of water quality and aquatic habitats and reporting to an agency having authority to enforce quality standards. This might be done in several ways.

(a) Assign to Geologic Survey. G.S. already has network of stream gaging stations and water temperature measuring stations on all major streams.

(b) Assign to Health, Education and Welfare. This would require more new organization than (a).

(c) Agencies to monitor changes in all streams on which they conduct activities and report to a central agency having enforcement authority. If any of these alternatives were followed, provision should be made for close cooperation with State Game Commission and State Department of Environmental Quality. Included should be provisions that would encourage the State to monitor changes on private lands.

5. Both of the land managing agencies should have adequate legal and policy safeguards and bond administrators to assure compliance.

Of the suggested alternatives, we favor 1, 2 and 3.

The suggestions above apply to federal lands. An obvious solution for private lands is enforcement of the State Water Quality Standards. Enforcement could be done best in Oregon by the State Forestry Department. The State Forestry Department already enforces the State Forest Practice Act. It has an established field force that visits all sales and cuttings on private lands.

Timber operators consulted felt that BLM practices and procedures were too rigid and could not be altered to fit the needs of environment. They recommended greater flexibility in road standards and in completion times on sales. They felt they were forced to build too much road and to work under conditions damaging to the sites just to finish on time. It is difficult to tell whether they were concerned with environment or profits.

LITERATURE CITED

1. Bauer, Jerry A. and Franklin M. Oliver. Undated (1969) Progress Report: Effect of timber harvest on Canton Creek and its tributaries. 43 pp. mimeo.

2. Beaufait, William R. and Owen P. Cramer, 1969. Prescribed fire and smoke dispersion - principle. U.S.D.A. Forest Service, Missoula, Mont., 12 pp., multi. (In-service distribution only).

3. Brown, George W., 1969. Predicting the effect of clearcutting on stream temperature. (Submitted to Jour. Forestry, Feb. 17, 1969).

4. Code of Federal Regulations; Title 36, Chapter II.; Parks, Forests and Memorials; Part 221, Timber.

5. Code of Federal Regulations; Title 43, Chapter 28; Public Lands; Section 1181; Oregon and California Railroad and Coos Bay Wagon Road Grant Lands.

6. Douglas County Planning Commission, 1968. The Character of Douglas County. 76 pp., illus. Roseburg, Oregon.

7. Hall, James D., 1967. Alsea Watershed study. 11 pp. proc.

8. Hall, James W. and Homer J. Campbell, 1968. The effects of logging on the habitat of Coho salmon and cutthroat trout in coastal streams. In "logging and salmon." Proceedings of a forum sponsored by the American Institute of Fishery Research Biologists, Alaska District, Juneau, Feb. 8-9, 1968.

9. Hall, James D. and Richard L. Lantz. 1969 Effects of Logging on the habitat of Coho Salmon and cutthroat trout in coastal streams. Ore. Agr. Exp. Sta. Tech Paper No. 2570.

10. Levno, Al and Rotacher, Jack. 1967. Increases in maximum stream temperatures after logging old-growth Douglas-fir watersheds. U.S. Forest Service Research Note PNW -65.

11. Maki, Wilbur R., Con H. Schallau and John H. Beauter, 1968. Importance of timber-based employment to the economic base of the Douglas-fir region of Oregon, Washington and Northern California. U.S. Forest Service Research Note PNW-76. Pacific N.W. Forest and Range Exp. Sta. Portland, Oregon.

12. Pintarich, Paul, 1968. North Umpqua: End of the Steelhead? Northwest section, Sunday Oregonian newspaper. Portland, Oregon, Dec. 1, 1968.

13. Schallau, Con, Wilbur Maki and John Beuter, 1969. Economic impact projections for alternate levels of timber production in the Douglas-fir region. Annals of Regional Science, 96-106.

14. U.S. Forest Service Multiple Use Management Plan, Steamboat Ranger District, Umpqua National Forest, Roseburg, Oregon.

Names of Confidential Contributors

(a) George Francis, Roseburg District Manager during interview.

(b) Robert Hosteller, Portland, as reported by Paul Pintarich.

(c) Robert Borovicka, as reported by PaulPintarich.

(d) Dave Luman, Wildlife Biologist, as reported by Paul Pintarich.

(e) Al Warren, Asst. Supervisor, Umpqua National Forest, Roseburg, Oregon.

(f) Fay Stewart, President, Bohemia Lumber Company, Eugene, Oregon.

(g) Arnold Ewing, North West Timber Association, Eugene, Oregon.

(h) C. P. Johnson, Johnson Lumber Company, Roseburg, Oregon and
George Webster, Douglas Timber Operators, Roseburg, Oregon.
(D. R. Johnson Company, Riddle, Oregon).

APPENDICES A-H

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APPENDIX A

Dec. 30, 1969

TRANSCRIPT OF THE PASS CREEK FILM DIALOGUE

Transcribed by R.W. Becking

The summer steelhead is a fly fisherman's fish. In late spring when the rivers turn low and clear, the fish return from the sea... There aren't many of them. Of the hundreds of the western rivers and streams that support the winter run of the sea-run rainbow, only a few will host the summer fish in any number. One of those rivers is Oregon's Umpqua, cutting its path to the Pacific through the volcanic rock of the central Oregon Cascades. The Umpqua is a wild and an exceptionally beautiful stream. For the fisherman it is almost unique for its year round clarity, its reliable run of strong summer steelhead, its more than 35 miles of preserved fly fishing water...

The North Fork of the Umpqua was Zane Gray's river, but he never wrote about it... The Umpqua was a great stream and he didn't want to see it ruined... Even then, men were watching their rivers begin to die... Too many fishermen, too few fish... Zane Gray wouldn't have liked what has been done to the river... They dammed it, and dynamited it and carved a highway out of its bank...

But the North Umpqua is still a great river, and the steelhead still run there... Sofar, whatever man has been able to do to the river, has not managed to kill the fish... Fishermen still fish from the ledges, wade deep in Wright Creek and the Log pool and climb out early to be the first to the camp water. The Umpqua is a big tough river but there may still be a way to kill it... Just above Steamboat where Zane Gray had his camp, a tributary called Steamboat Creek joins the North Fork. That's where the fish come from...

In mid summer, the steelhead began to move in the protective water of Steamboat Creek together and rest in the deep pools. And in the winter in the gravel beds of the rain-swollen creek and its tributary streams more than half of the Umpqua steelhead population is spawned.. Only after feeding and growing in these clear cold waters for two full years, do the young fish drift down to the sea...

The steelhead's road is also the loggers' road. Mile for mile they make their way together through the timbered valleys of the Umpqua watershed. They have to share the same roads because they share the same trees...

One of the roads led to Pass Creek. Pass Creek is a tributary of the Steamboat Creek system that feeds the Umpqua. It was a typical steelhead spawning stream in the summer of 1966... Alder and vine maple mixed with firs covered the stream and protected it from the sun. The land was marked for logging. A road was laid out and under the supervision of its owner, the Bureau of Land Management, Department of the Interior, the loggers went to work... They finished in the spring of 1968...

The method for taking the timber at Pass Creek is called clear-cutting. It's a standard logging practice. In many cases, clear-cutting is the only practical way to harvest the trees, and it can be done without any serious damage to the streams. A narrow strip left standing on both sides of the creek bed can preserve the spawning waters, but it takes some effort... No one made the effort at Pass Creek...

The steelhead needed only enough trees to provide shade to keep the waters cool. They took all the shade. Exposed to the sun, the water grows too warm for the small trout and the food that remains will be taken by dace and other scrap fish that thrive in the warmer water.. The steelhead needed only enough trees to keep the stream from flooding. A 200ft. strip on either side would have been enough. But the loggers took the timber and they took it the easy way. In the fall, the cat roads moving down the paths of the feeder streams and into the creek will drain tons of mud into the water. The soil above, loosened by logs dragged downhill will silt the spawning gravel for miles downstream...

The steelhead needed the rocks and trees to protect the banks of Pass Creek, but the cats moved them out. When the floods come, the banks will be washed away and the stream stripped of its gravel. The fish may still come to spawn if the creek isn't blocked by the slash now piled on its banks. But if the eggs are not washed out by the flood, they will probably suffocate under the silt. The BLM put the road on the creek because it was easier... The logs were dragged downhill because it was easier... They ran cat roads across the creek because it was easier... This section of Pass Creek was destroyed because it was easier and perhaps a little more profitable than it would have been to let it live... Even if Pass Creek dies the Umpqua will still be a great river.

But there are dozens of little streams like Pass Creek that flow into other streams and flow into others before they reach the Umpqua. Together those streams are the Umpqua! They nourish and cool it; Give it its water and its fish! And each year, in the places no one sees, new logging eats away the trees along those creeks in these hills above the river, Grizzly Creek... Trapper Creek... Canton Creek.. Each year the waters grow warmer, and each year more streams die... If the steelhead no longer run in the Umpqua, no great harm will be done. There will still be other rivers and fishermen can find and win for awhile the race with pollution, and needless dams and thoughtlessly planned roads and careless logging. Once those rivers are destroyed, they can leave them too and find others... Until the time comes for the fish and fishermen when there is no place left to go.....

DR. RUDOLF W.
ARCATA

APPENDIX B.

MANAGEMENT UNIT NO. 60 - ANADROMOUS FISH HABITAT

Management Situation The upper North and South Umpqua Rivers and many of their tributaries (see District and Forest Wildlife Management Plans) serve as spawning areas for salmon, steelhead and sea-run cutthroat trout. Runs of the fish have increased in the past 10 years, and further increases are expected. Management of these fish, including establishing regulations and stocking, is the responsibility of the Oregon State Game Commission.

Fish spawned and reared on the National Forest contribute very significantly to the total fishery of the Umpqua system. As adults, these fish are taken at sea from California to Washington by sport and commercial fishermen, and by sport fishermen in the river system. Total value of these fish is estimated to be several millions of dollars.

High-quality spawning gravels are limited. Because of the limited gravels, the per-acre values are very high and warrant intensive protective efforts. Management should be aimed at preventing siltation protecting water temperatures.

MANAGEMENT DECISION

1. All road crossings on anadromous fish-bearing streams will provide fish passage.
2. Equipment will not be operated in streams with active spawning gravels.
3. Streamside vegetation will not be removed on active spawning streams.
4. Streamside shade will be preserved on all tributaries above spawning areas. No more than 10 percent of the stream length of these tributaries will be open at one time.
5. Stream and spawning gravel improvements will be encouraged.
6. Debris barriers will be removed currently.

APPENDIX C

BUREAU OF LAND MANAGEMENT

MANUAL SUPPLEMENT

OREGON STATE OFFICE

TRANSMITTAL SHEET

Date: April 30, 1969

Release No. 83

Subject: 5110 - STREAM PROTECTION

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1. Explanation of Material Transmitted: This release outlines State policy and provides guidelines for protecting streams during timber management activities.

2. Material Superseded: None

3. Filing Instructions:

Insert	Remove
Table of Contents 5110 (6 pages)	None

Archie D. Craft

State Director

5110 - STREAM PROTECTION

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5110 - STREAM PROTECTION

.01 Purpose. The purpose of this supplement is to provide State policy and guidelines for the protection of streams during all timber management activities. All streams containing water on a year-round basis during a normal year are included. If there is a question of stream importance, contact Game and Fish Commissions.

.02 Objectives and Background. Bureau policy requires that all multiple uses of the land be conducted in accordance with sound watershed management principles whenever existing or potential usefulness of water, control of runoff, or stability of the soil is involved. Although BLM land management programs in the past have given significant attention to the conservation of soil and water, increased emphasis on the preservation of fish habitat and water quality demands drastic further changes in attitude and approach.

The Secretary of the Interior's directives on non-degradation of existing water quality and the standards of water quality set forth by the Federal Water Pollution Control Administration and the State Sanitary Board are in district files. These guidelines set forth the minimum standards.

While management intensification is strongly influenced by appropriation levels, many changes are possible within our current programs. Progress in improved watershed management is of the utmost importance to develop the attitudes and abilities which are required to accomplish resource management objectives. Timber management has a strong influence on water yield, water quality, soil stability, wildlife, recreation, and other non-timber values. Therefore, a careful appraisal must be made of the influence our management activities have within a given watershed on the non-timber values.

.03 Authority. (See BLM Manual 5000)

.04 Responsibility. All employees have an inherent responsibility to keep abreast of the latest developments pertaining to stream and watershed protection and to constantly look for ways to improve our management procedures and practices. The DISTRICT MANAGERS have primary responsibility for seeing that all land resources within their area are adequately considered and protected during the planning and implementation of management activities. The district staff has the responsibility for keeping abreast of new developments and for interpreting and relating these developments to the district management programs.

.05 Definitions. (Reserved)

.06 Policy

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Procedures. If we are to do an adequate job of stream protection, the emphasis must be on adequate prior planning rather than corrective measures. Even the best corrective measures are a poor second to preventing disturbance of a stream in the first place. See BLM Manual 6760 for specifics on stream habitat development.

In many cases the single most important item in protecting an aquatic community is the leaving of undisturbed stream-side vegetation. It makes little difference whether this stream-side vegetation is mature Douglas-fir, hardwoods, or brush. Our major effort in stream protection should be directed towards finding ways of doing our management job with the minimum impact on the stream-side environment. In many cases, it may be practical to provide the optimum amount of stream-side protection. Our decision to do less than the optimum in these cases should be based on a thorough evaluation of the alternatives involved. Imagination and innovation are the key words in this situation. We cannot seek to maintain the status quo in our management programs but must aggressively seek ways to improve them.

Following are a few guidelines that should be considered during the planning stages:

.11 Road Planning.

A. Watershed considerations should be involved in determining road andards. Balancing of earthwork, good compaction, and unstable slope otection should be a consideration of each road project. High standard ads may expose more ground and, possibly, contribute greater amounts of diment. Where high watershed values are involved it may be desirable to dify existing road standards. As an example, we may consider lowering e standards for width and alignment and raising the standards for drain- e and surfacing to lessen the impact of the road on the watershed.

B. Consideration should be given to grades and alignment to take vantage of existing topography in locating roads away from streams. s soil maps become available they should be consulted during the planning ges of any road.

C. A buffer strip of undisturbed land between road fills and reams should be left whenever possible. No clearing that is not abso- tely essential to the construction of the road should be done along reams. Contract administrators have the responsibility for "on-the- ound" prevention of stream damage during construction.

D. Alternatives should be thoroughly investigated before locating road along a stream channel. If a stream-side location is mandatory, a responsible fishery biologist should be consulted during the planning stages.

E. Any channel changes should be held to a minimum and planned in detail if they are absolutely essential. In all cases, the local fishery agency should be contacted for their recommendations on timing and design criteria.

F. Plan to end-haul all excavation material that would be harmful in streams to places where it can be used as rip rap, fill, or wasted in spoil areas that will not contribute sediment to the streams.

G. Plan culvert installations carefully so placement is made as near existing groundline as possible. Make sure backfill is properly compacted and culvert rests on stable footing. Use of full round culverts, plastic or rubber tubing, or rip rap at culvert outlets if necessary to prevent cutting.

H. Plan to use an adequate number of diversion culverts so that some of the sediment from ditch water will be filtered out by natural vegetation rather than accumulate in the drainage.

I. In any instance where culvert installation presents a fish passage problem, a responsible fisheries biologist should be consulted early in the initial planning stages.

J. Soil stabilization practices should be made a part of the construction project if benefits from this practice are justified.

Detailed plans should be made for treatment of any fill material that will be reached by streams during heavy runoff. Such treatment may include immediate mulching or seeding with quick germinating plant species. Consult BLM Manual 7413 and Oregon Interagency Recommendations for Conservation and Forage Seeding (1964) for detailed information.

Timing is important. Avoid wet weather road construction if possible.

.12 Timber Sale Planning.

A. Timber sale layout planning must include identification of sale requirements to provide non-pollution of streams as required by Executive Order 11288 and Oregon State Standards of Quality for Public Waters of Oregon and Disposal Therein of Sewage and Industrial Wastes.

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Stream-side corridors will be designed specifically for the purpose of meeting the water pollution standards. Corridor design attention must be given to the width, composition and density of the vegetative cover needed. Tree removal from the corridor for purposes of composition or density control or for salvage must be accomplished with a minimum disturbance to the stream and stream bank.

To the extent possible, the sale layout plan should include facilities, principally access, which would enable subsequent management of the corridor.

B. The use of tractors should not be allowed on steep ground, unstable soils, or in any area where they will create an erosion problem or contribute to stream siltation.

C. Uphill, high-lead or skyline type settings have the least impact on the watershed and are to be used whenever possible. In some soils road building may be a principal source of sedimentation. Benefits to be gained from uphill cable type logging may be offset by excessive amounts of road building that may be required. Coordinate road construction so as to avoid detrimental effects in fish habitat.

D. Plan landings in advance and, if necessary, require specific landing sites to prevent landings being located in draws or areas where they will present an excessive erosion problem.

E. Timber harvesting on severe sites should be excluded. On some of these sites the damage to the soils and watershed may offset the benefits to be gained from a single crop of timber. An example could be very steep, dry slopes with shallow soils.

.13 Stream Improvement and Rehabilitation. After weighing all the lternatives, if it becomes apparent that our operations must necessarily isturb a stream, damage will be kept to an absolute minimum. Corrective easures will be applied as necessary. The following lists some practices hat can be used.

A. Road Construction Administration.

1. Channel changes should be completed, including rip rap where ecessary, before water is turned into them.

2. Large selected boulders should be placed in the new channel provide fish cover, break up the stream flow, and get away from the uice box effect.

3. Large stream culverts should be set at the original stream bed gradient to allow for passage of migrating fish. Use half or full round, rip rap, or aprons to protect fills at road drain culvert outlets. Random fills should be considered and used where appropriate.

4. A good crown should be kept on all roads during construction and on finished subgrades after the sale is closed in preparation for wet weather. Consideration should be given to hard surfacing permanent all-weather roads.

5. Be especially careful of anything that will cause sedimentation during low flows when the fish have no escape from the sediment.

6. Except as absolutely essential, keep road construction equipment out of stream channels.

7. If road construction is not completed in one season, adequate measures must be taken to leave the uncompleted subgrade in a condition that will not unduly contribute to the sediment load of nearby streams.

8. Water bar dirt and spur roads, and in slope secondary road systems.

9. Abandoned roads should be left in a condition that will prevent future use.

10. Provide drainage for, and reseed, all abandoned roads and landings for good watershed protection.

B. Timber Sale Administration

1. Complete reconnaissance of the area should be made to spot any possible problems pertaining to road placement or methods of harvest.

2. If a stream must be included within the boundaries of a timber sale, care must be taken to insure that the timber is felled away from the stream and not into the water. This is especially important during the summer months when large accumulations of fir needles and other fine organic matter in the stream can effectively reduce the dissolved oxygen content of the water and cause fish mortality in the immediate vicinity and for a considerable distance downstream. A corridor along the stream will provide almost complete protection.

3. Gross yarding or other special measures should be included within timber sale contracts wherever they would facilitate the stream clearance problem.

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4. Streams on the contract area should be safeguarded coninually and not ignored until logging is completed. Debris that could ause stream blockages must be removed to a safe distance above the xtreme high water mark, even if it is necessary to use special equipment r hand work. Stream clearance is a necessary part of each timber sale ontract.

5. Putting a cat in a stream bed is the most undesirable method f stream clearance. All possible use should be made of the high-lead r other cable equipment to remove large debris from the stream courses s logging progresses.

6. On both high-lead and tractor settings, stream crossings hould be limited to improved crossing sites, using log cribbing or bedock areas. Crossings should not be located in areas containing spawning ravels. Remove the installed crossing facility and restore banks after ompletion of logging.

7. Logging equipment should be kept out of and away from streams s much as possible. Stream-side hardwoods will be protected and not be elled.

8. Water bars should be installed at frequent intervals in roadays to prevent concentration of runoff and to divert it to safe locations here it can filter under the forest floor.

9. On tractor settings, skid trails will be used as few times as ossible to avoid trenching and compaction. Adequate provision for drainge will be made on all skid trails.

10. Logging plans will specify problem areas where special measres should be taken to protect unstable soil or other watershed values.

11. Fire break trails shall be drained and water barred as ecessary to adequately handle runoff.

12. Efforts will be made to scarify and loosen compacted soil landings and skid trails immediately upon completion of logging. Vegation will be established to prevent erosion.

13. Temporary culverts, bridges and stream crossings should be moved immediately upon completion of logging, upon a cessation of logng activities for the season, or prior to wet weather and high water.

14. All erosion and runoff control measures shall be installed mptly as logging is progressively completed.

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15. On minor spur roads, consider the use of an outsloping configuration without ditches to provide adequate drainage.

.14 Coordination Requirements. BLM in Oregon has entered into cooperative state-wide agreements with both the Oregon State Game Commission and the Oregon State Fish Commission. Copies of these agreements are available in our files. In general, these agreements require the following action on our part:

A. We must coordinate land and resource management that will benefit fish and wildlife, consistent with a sound multiple use program.

B. We must cooperate in the restoration, harvesting and general management of the wildlife resources of the State of Oregon consistent with the multiple use program.

C. To cooperate in the formulation and application of practical plans and programs for the management of wildlife and wildlife habitat upon BLM lands.

D. Whenever the BLM plans field activities that will directly affect the fishery resources, the agreements require that we consult with the appropriate fisheries agency. State fisheries biologists are cooperative, capable individuals who are more than willing to meet and discuss any problems. We should take advanrage of the expertise offered by the individuals and get the benefit of their advice whenever we plan activities directly affecting streams. A list of Game Commission offices and principal Fish Commission labs are listed on Appendix 1.

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Oregon State Office

70-26

APPENDIX D

ecember 12, 1969

P. O. Box 2965 (729 NE Oregon Street)
Portland, Oregon 97208
234-3361, Ext. 4025 (Guidry and Radosta)

LM News for immediate release

LM HIRES ELEVEN NEW SCIENTISTS

Six fishery biologists, four soil scientists, and a forest hydrologist have een added to Bureau of Land Management offices in western Oregon.

A fishery biologist is assigned to each of the five western Oregon district fices, located at Salem, Eugene, Roseburg, Medford, and Coos Bay, and the state fice in Portland. A soil scientist is assigned to each of the western Oregon stricts except Coos Bay. BLM is currently seeking a scientist to fill this sition. The forest hydrologist is stationed in the Portland office.

"The primary function of these specialists is to study and help interpret the mplex relationships between fish, soil, water, and trees," said Archie D. Craft, M's state director for Oregon. "This knowledge will help our resource managers termine the impact of logging and other activities on fish habitat, soil stabil-y, and stream quality," Craft added.

Craft noted that the demand for lumber, plywood, and other forest products can expected to remain strong. BLM timber lands in western Oregon and the forest agement practices applied to these lands will play a substantial role in meeting t demand, he added. At the same time, these public lands will provide necessary ce for camping, hunting, and other rapidly growing outdoor recreation uses.

"Our multiple use concept envisions fulfillment of both kinds of needs," Craft d, "and the additional expertise we've recently acquired will go a long way ard meeting this goal."

x x x

New Scientists

Oregon State Office - Portland

1. Fishery Biologist - Austin Magill
2. Forest Hydrologist - Dr. Henry Froehlich

Salem District Office

1. Fishery Biologist - Gary Gebhardt
2. Soil Scientist - Bill Powers

Eugene District Office

1. Fishery Biologist - Russ Hammer
2. Soil Scientist - George Chalafant

Roseburg District Office

1. Fishery Biologist - Frank Oliver
2. Soil Scientist - Bill Wirt

Medford District Office

1. Fishery Biologist - Don King
2. Soil Scientist - Lee deMoulin

Coos Bay District Office

1. Fishery Biologist - John Anderson
2. Soil Scientist - (vacant - to be filled)

Notes of Decisions

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1. Constitutionality

The provision exempting land from debts is within the power of Congress. Adams v. Church, 1902, 70 P. 1037, 42 Or. 270, 59 L.R.A. 782, 95 Am.St.Rep. 740.

2. Valid existing rights

The repealing act declared that it should not affect any valid existing rights. Bucklin v. U. S., Kan.1895, 16 S.Ct. 182, 159 U.S. 682, 40 L.Ed 305.

3. Debts, generally

A judgment against a surety on a supersedeas bond is a "debt" contracted at the date of the approval of such bond. Leman v. Chipman, 1908, 117 N.W. 883, 82 Neb. 392.

The only interest in government land that the United States can convey by patent under the timber culture act is an estate free from all involuntary liens and debts of the patentee contracted prior to the issuance of the final certificate. Gould v. Tucker, 1905, 105 N.W. 624, 20 S.D. 226.

The provision that no land acquired under this section shall become liable to the satisfaction of debts is a substantial re-enactment of a provision of the homestead law, and will be enforced in the state as well as the federal courts. Gould v. Tucker, 1904, 100 N.W. 427, 18 S.D. 281, affirmed on rehearing 105 N.W. 624, 20 S.D. 226.

Taxes are not debts within the meaning of the exemption clause of this Act. Danforth v. McCook County, 1898, 76 N.W. 940, 11 S.D. 258, 74 Am.St.Rep. 808.

OREGON AND CALIFORNIA RAILROAD AND COOS BAY WAGON ROAD GRANT LANDS

§ 1181a. Conservation management by Department of Interior; permanent forest production; sale of timber; subdivision

Notwithstanding any provisions in the Acts of June 9, 1916 (39 Stat. 218), and February 26, 1919 (40 Stat. 1179), as amended, such portions of the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands as are or may hereafter come under the jurisdiction of the Department of the Interior, which have heretofore or may hereafter be classified as timberlands, and power-site lands valuable for timber, shall be managed, except as provided in section 1181c of this title, for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal[1] of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilties[2]: *Provided*, That nothing in this section shall be construed to interfere with the use and development of power sites as may be authorized by law.

The annual productive capacity for such lands shall be determined and declared as promptly as possible after August 28, 1937, but until such determination and declaration are made the average annual cut

§ 221.1 Timber uses.

The Chief, Forest Service, is hereby authorized to permit the use of the timber resource of the national forests and to delegate this authority to subordinate officers, to the extent, in ways, and by means compatible with the laws and the other regulations of the Secretary of Agriculture concerning such use, so as to make that resource of the greatest permanent usefulness to the people of the United States.

[13 F.R. 7711, Dec. 14, 1948]

§ 221.2 Future growth, reduction of hazard, utilization.

Each sale or other use of national forest timber will be authorized only after the approving officer is satisfied that practicable fire-prevention measures and methods of cutting and logging are prescribed which will preserve the residual living and growing timber, promote the

§ 221.6 Authorization to make sales.

(a) One of the prime objectives of national forest management is to develop an orderly program of timber sales designed to obtain the regular harvest of national forest timber at allowable cutting rates as determined by timber management plans prepared in accordance with § 221.3(a) for management of national forest timber resources.

(b) The Chief, Forest Service, is authorized to make timber sales for any amount on any national forest, subject to the maximum cut fixed in accordance with established policies for management of the National forests. He may delegate and provide for the redelegation of this authority to subordinates for amounts not exceeding, in any one sale, 50 million feet board measure, or the equivalent thereof.

(c) The Chief, Forest Service, after approval of conditions of sale, may authorize Regional Foresters formally to execute timber sale contracts and related papers in sales exceeding the volume which the Regional Forester has been authorized to sell.

(Interprets or applies 74 Stat. 215, 16 U.S.C. 528–531) [28 F.R. 723, Jan. 26, 1963]

APPENDIX G

MULTIPLE USE-SUSTAINED YIELD ACT

ct of June 12, 1960 (74 Stat. 215; 16 U.S.C. 528–531)

ec. 1. It is the policy of the Congress that the national forests are tablished and shall be administered for outdoor recreation, range, mber, watershed, and wildlife and fish purposes. The purposes of is Act are declared to be supplemental to, but not in derogation of, e purposes for which the national forests were established as set rth in the Act of June 4, 1897 (16 U.S.C. 475). Nothing herein all be construed as affecting the jurisdiction or responsibilities of e several States with respect to wildlife and fish on the national rests. Nothing herein shall be construed so as to affect the use or ministration of the mineral resources of national forests lands or to fect the use or administration of Federal lands not within national rests.

ec. 2. The Secretary of Agriculture is authorized and directed to evelop and administer the renewable surface resources of the national rests for multiple use and sustained yield of the several products nd services obtained therefrom. In the administration of the na- onal forests due consideration shall be given to the relative values of e various resources in particular areas. The establishment and aintenance of areas of wilderness are consistent with the purposes and rovisions of this Act.

ec. 3. In the effectuation of this Act the Secretary of Agriculture is uthorized to cooperate with interested State and local governmental gencies and others in the development and management of the na- onal forests.

ec. 4. As used in this Act, the following terms shall have the follow- g meanings:

(a) "Multiple use" means the management of all the various re- ewable surface resources of the national forests so that they are tilized in the combination that will best meet the needs of the Ameri- an people; making the most judicious use of the land for some or all f these resources or related services over areas large enough to provide ufficient latitude for periodic adjustments in use to conform to chang- ng needs and conditions; that some land will be used for less than ll of the resources; and harmonious and coordinated management of he various resources, each with the other, without impairment of the roductivity of the land, with consideration being given to the relative alues of the various resources, and not necessarily the combination of ses that will give the greatest dollar return or the greatest unit utput.

(b) "Sustained yield of the several products and services" means he achievement and maintenance in perpetuity of a high-level annual r regular periodic output of the various renewable resources of the ational forests without impairment of the productivity of the land.

APPENDIX H

11-025 GENERAL WATER QUALITY STANDARDS. The following General Water Quality Standards shall apply to all waters of the state except where they are clearly superseded by Special Water Quality Standards applicable to specifically designated waters of the state. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the state:

(1) The dissolved oxygen content of surface waters to be less than six (6) milligrams per liter unless specified otherwise by special standard.

(2) The hydrogen-ion concentration (pH) of the waters to be outside the range of 6.5 to 8.5 unless specified otherwise by special standard.

(3) The liberation of dissolved gases, such as carbondioxide, hydrogen sulfide or any other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters.

(4) The development of fungi or other growths having a delererious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry.

(5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish.

(6) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry.

(7) Objectionable discoloration, turbidity, scum, oily sleek or floating solids, or coat the aquatic life with oil films.

DR. RUDOLF W. BECKI

(8) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or to be otherwise injurious to public health.

(9) Any measurable increase in temperature when the receiving water temperatures are 64°F. or above, or more than 2°F. increase when receiving water temperatures are 62°F. or less.

(10) Aesthetic conditions offensive to the human senses of sight, taste, smell or touch.

(11) Radiosotope concentrations to exceed Maximum Permissible Concentrations (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products or pose and external radiation hazard.

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ARCATA, CALIF 95521

CASE STUDY NO. X

INSECT-DISEASE CONTROL COMPOSITE

by

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Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

INTRODUCTION

Insects and diseases are integral parts of the forest ecosystem. When environmental conditions are favorable for multiplication of pest species, an outbreak may develop and cause extensive tree damage and tree mortality. A common circumstance that leads to insect outbreaks is an extensive and contiguous forest composed of one or two species and one age class. The most resistant forest is one composed of many species with a balance in ages from seedlings to mature trees. Currently, most of the coniferous forests in public ownership in the western United States are highly vulnerable. The silviculturist has a limited choice of species in the Western forests, although he can achieve a forest of many ages, either within the stand or in blocks.

The rate and time of development and duration of outbreaks is also influenced by weather and the efficiency of the natural enemies of the pest.

The common objectives of projects to control native insects on public lands have been to: (1) protect the wood values until access roads can be built and saw mills increased to a sustained yield capacity; (2) preserve historical, esthetic, and local high-value investments in campgrounds, buildings, and other recreational facilities; and (3) to prevent disaster conditions that threaten whole ecosystems. Justification for control projects commonly includes general statements about protection of esthetic, recreation, water, fisheries, and wildlife values.

The Forest Pest Control Act of June 25, 1947 (Public Law 110) authorized Congress to appropriate funds to the Secretary of Agriculture to protect and preserve forest resources of the United States. 1/ Currently, the Act is being funded at a level of approximately $10 million annually. The Department of Agriculture then allots funds to other departments for surveys and control on federal lands and to state agencies on a cooperative basis for surveys and control on state and private lands.

A review and analysis of four insect control projects and a widespread problem with dwarfmistletoe on lodgepole pine follows.

1. INSECT AND DISEASE OUTBREAKS AND CONTROL

a. Spruce Beetle in Colorado and Northern New Mexico

(1) White River Plateau

An outbreak of the spruce beetle on the White River Plateau north of Glenwood Springs, Colorado, White River National Forest, was reported

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1/ Forest Pest Control Act, 61 Stat. 177 (1947), 16 U.S.C. §594-1-5 (1960).

by a District Forest Ranger in 1942 (16). The information was relayed through the Forest Supervisor to the Regional Forester and to the Regional Forest Entomologist of the U.S. Department of Agriculture. A survey that followed in 1943 showed that the entire White River Plateau, including the Flat Tops Primitive Area (Fig. 1), had many hundreds of thousands of Engelmann spruce trees infested, and that the magnitude of the outbreak and lack of access roads precluded consideration of direct control measures. Research on the biology of the beetle and development of chemical control methods were started in 1944 (16). Comprehensive surveys of the White River Plateau were made annually to follow the development of the outbreak (Figs. 2 and 3). Also, reconnaissance surveys were made annually in the surrounding spruce forests, separated from the White River Plateau by 16 to 50 miles. The strategy was to watch for the development of localized outbreaks in the outlying spruce forests, and if practical, treat the infested trees to prevent the envelopment of much of the spruce forests in Colorado (26).

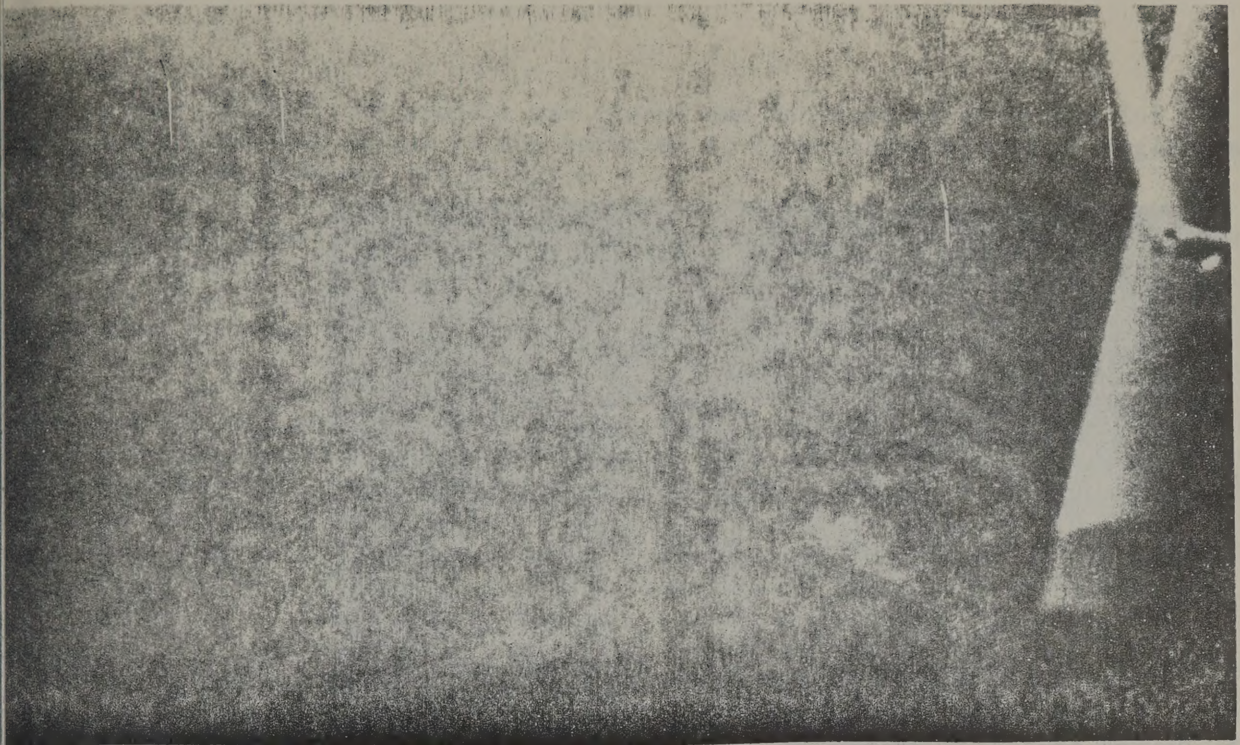
A Forest Pest Control Committee was organized and sponsored by The Colorado Forestry and Horticulture Association. The first meeting was called in the fall of 1949, after the summer surveys were completed. Open invitations were extended to all interested people to attend and to review the current status of the outbreak. Representatives from the U. S. Forest Service, Bureau of Entomology and Plant Quarantine of the Department of Agriculture, National Park Service, Colorado State Forest Service, State Entomologist, private forest industries and conservation groups such as Izaac Walton League, attended the annual meetings, as well as journalists from several of the leading newspapers in Colorado, and lay people. Press coverage of the annual meetings apprised the public of developments and the strategy for control.

Outlying spot infestations were found in 1949 on Hardscrabble and Red Table Mountains south of Eagle, Colorado, and to the east on the Routt and Arapahoe National Forests. After Forest Service officials reviewed the survey findings in 1949, a meeting of the Forest Pest Control Committee was called.

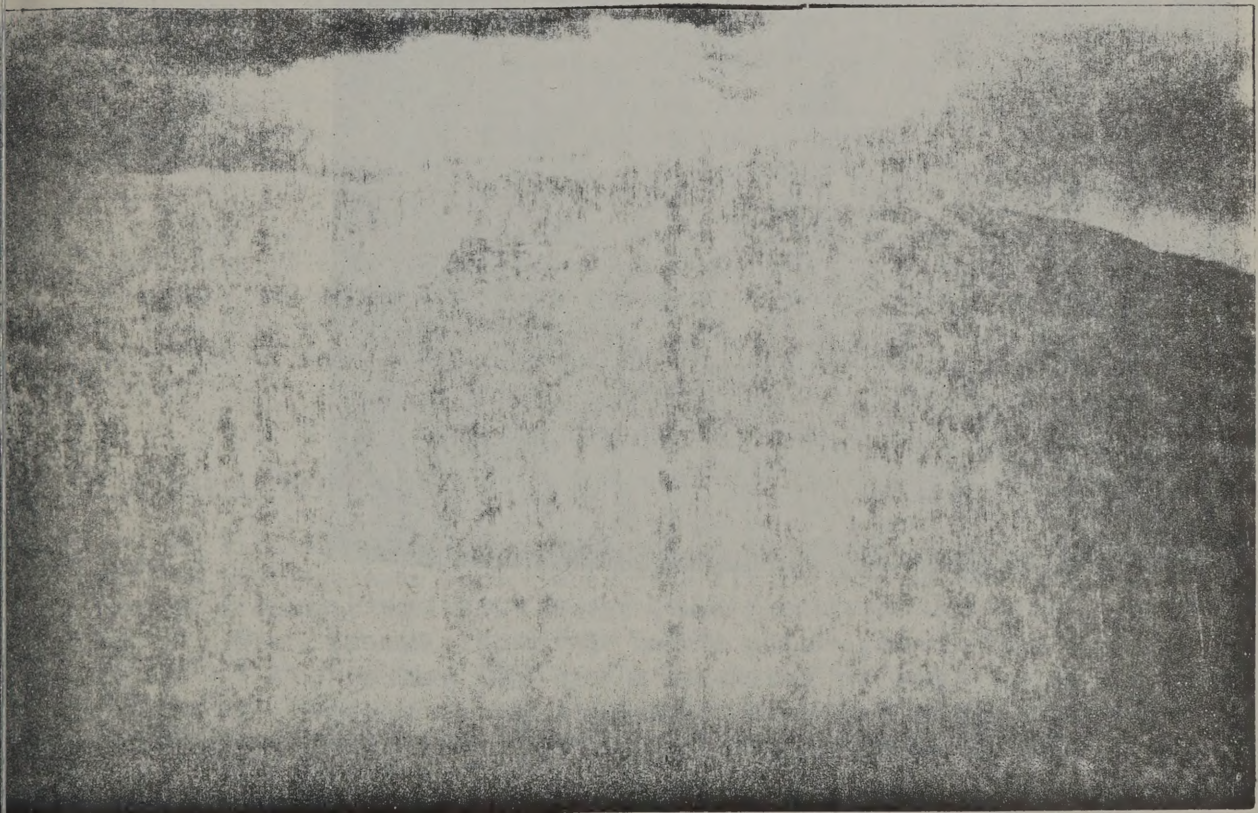
A pilot-plant control project was set up on Basalt Mountain in the fall of 1949 to test various control procedures on 3,000 trees. The pilot test was successful and plans were made for a program to treat 651,000 trees in 1950. A request for a deficiency appropriation of $2,855,000 was submitted by the U.S. Department of Agriculture and Congress appropriated $2,000,000 in June, 1950. When the project closed in October, a total of 784,082 infested trees had been treated.

In 1950, more than 2,800,000 acres of forests were surveyed. The survey indicated 1,643,000 trees in need of treatment in 1951.

On February 1, 1951, record low temperatures occurred throughout the infested area. Temperatures as low as -59°F. were recorded in the mountain valleys. This resulted in nearly complete mortality of the beetle brood above the snowline. Accordingly, the control project in 1951 was reduced to treat 200,000 trees. After treatment of 233,000



'ig. 1. Trappers Lake in foreground, Flat Top Primitive area in background. Picture taken in 1950 when most of the Engelmann spruce were infested but had not lost their needles. White River National Forest.



ig. 2. Engelmann spruce killed by spruce beetle 1947-49. Ripple Creek Pass, White River National Forest. Note surviving subalpine fir in understory.

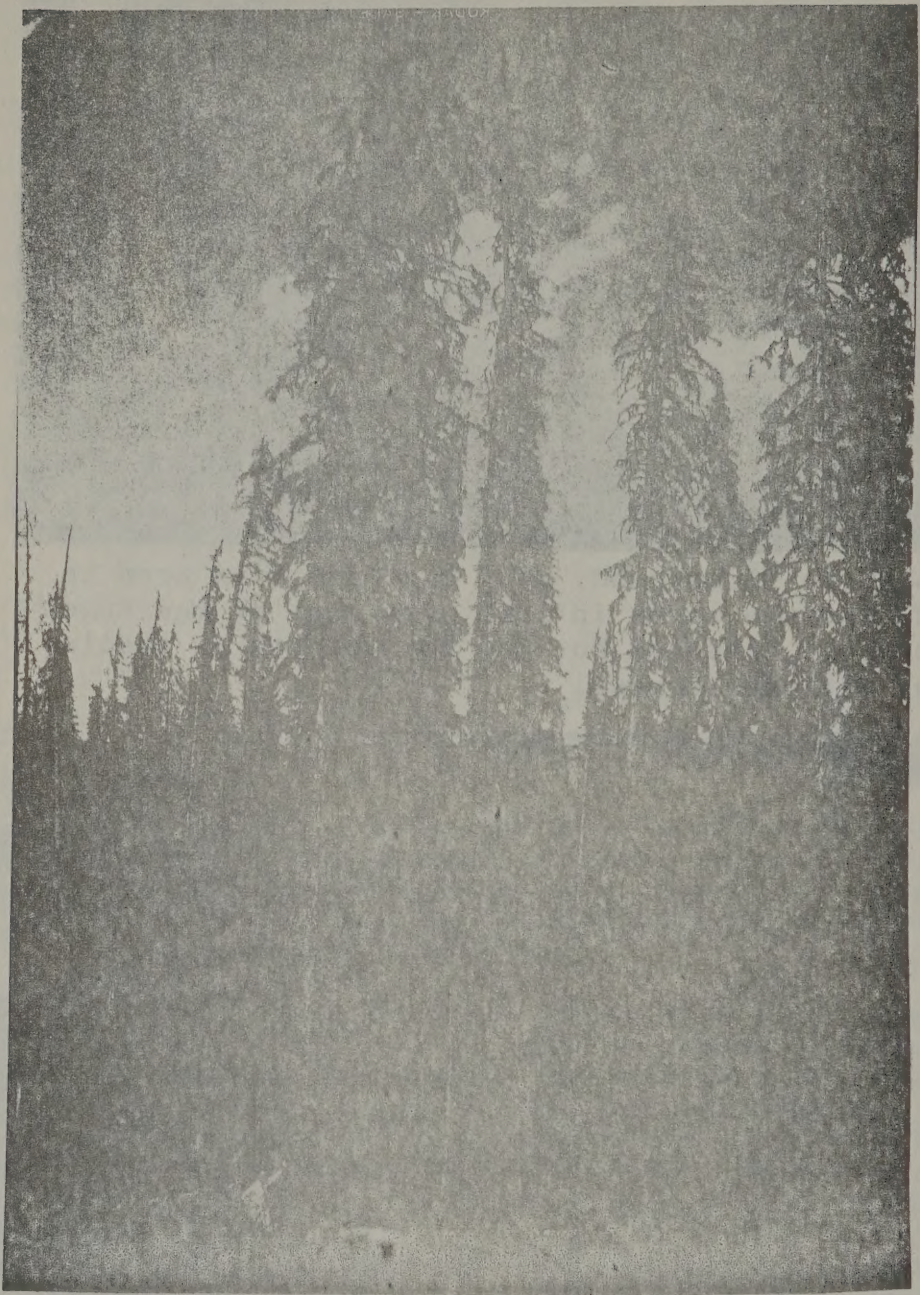


Fig. 3. Engelmann spruce killed by spruce beetle around 1944, White River National Forest. Large tree in foreground was 500 years old. Note surviving young stand of Engelmann spruce and subalpine fir.

trees in 1952, the project was closed and declared to be successful in preventing the spread of the outbreak to other large bodies of Englemann spruce in Colorado (18,27,35).

Research surveys showed that the outbreak developed in a widespread blowdown of Engelmann spruce in small groups on the White River Plateau. In these blowdowns the spruce beetle produced large broods that went into standing trees in 1942 and 1943.

The outcome of the control project would not have been so decisive had it not been for the high mortality of the brood in February 1951, and the high predation of woodpeckers upon the brood (13,16). Without this help the outbreak might have lasted longer and killed larger areas of spruce. The most important natural enemy of the spruce beetle is the northern three toed woodpecker. Its numbers increased to as many as nine birds per acre (38) and predation in many trees approached 100 percent.

The ecosystem on the White River Plateau, as the result of the outbreak, was changed from a virgin Engelmann spruce-subalpine fir forest of 300 to 500 years old to a forest of young subalpine fir and spruce (Fig.2). In some areas the young stand of mostly subalpine fir was adequate for restocking. In many areas the land is understocked (20).

Streamflow increased about 2.3 inches of water per year following the cessation of the outbreak (15), and observations indicate little or no damage to the functioning of the watershed in producing high quality water.

Yeager found that a large amount of herbaceous and other plant growth developed on the forest floor. This in turn increased the amount of summer forage for big game animals (37).

The impact upon people when first viewing 500,000 acres with 4 billion board feet of dead spruce varies greatly. Some recreationists are greatly disturbed and wonder why such a disaster was allowed to happen. The user of wood sees a valuable product going to waste. The ecologist sees the aftermath of dead trees as a normal sequence in the life cycle of a spruce forest.

(2) Rabbit Ears Pass

An extensive and severe outbreak of the spruce beetle occurred about 1850 in the Engelmann spruce-subalpine fir forests on the Park Range east of Steamboat Springs, Colorado, now part of the Routt National Forest. Most, if not all, of the mature and overmature Engelmann spruce was killed at that time (36). The subalpine fir-Engelmann spruce forest that exists today should tell much about how the beetle-killed spruce forests on the White River Plateau will be 100 years from now.

The Ute Indians set off extensive forest fires near Rabbit Ears Pass, southeast of Steamboat Springs, during the summer of the Meeker Massacre of 1878. However, unburned islands of forests up to several hundred acres survived within the area, and occasional snags and many stems on the ground remain today (Fig. 4).

The fire-scarred snags show the unmistakable egg galleries made by the spruce beetles prior to the fire. (The spruce beetle egg gallery, about 6 inches long, is made by a pair of beetles attacking living trees in the inner bark, slightly grooving the wood. This causes a heavy infiltration of pitch that clearly preserves the outline of the gallery.)

Subalpine fir is the predominant species in the area today, the larger trees having been present as advanced reproduction at the time of the outbreak. Also present are a small number of spruce trees up to 30 inches in diameter. An examination of the annual rings on the largest spruce trees within 15 feet of standing snags reveals a sharp increase in growth rate around 1850, the time of release from competition of the overstory. The green spruce were 2 to 4 inches in diameter in 1850 and too small to be attacked by the spruce beetle.

During the next century, the shorter-lived subalpine fir will give way to the longer-lived Engelmann spruce, reverting to a predominantly spruce forest. Unless harvested the spruce forest again will become prey to a spruce beetle outbreak and the cycle will be repeated.

(3) Rancho Del Rio Grande Grant-Carson National Forest

Large populations of the spruce beetle developed from 1954 to 1960 in cull logs on the Rancho Del Rio Grande Grant (private land), adjacent to the Taos and Penasco Ranger Districts, Carson National Forest. In 1960 the beetles flew into the adjacent Engelmann spruce stands within the National Forest, threatening much of the mature to over-mature spruce. Approximately 18 trees per acre were infested in 1960 and 24 trees per acre in 1961 within an area of 5,000 acres -- clearly a critical situation (10).

Drastic action by the U.S. Forest Service controlled this man-caused outbreak by 1964, but in so doing converted 11,000 acres of spruce forest type to a mountain grassland type (Fig. 5). While the area of the environmental impact is relatively small, the outcome illustrates what can happen to a subalpine forest when severely disturbed by operations to control the spruce beetle.

The U.S. Forest Service started the control operation in 1960 using chemicals (ethylene dibromide), trap trees, and logging. Most reliance was placed upon logging the infested and green trees to stem the outbreak. By the end of 1964, 39 million board feet of Engelmann spruce on 11,000 acres had been sold, the acreage logged and the slash and cull logs burned. Brush disposal methods to kill the beetles in the cull logs and slash included: cabling followed by burning (Fig. 6), machine and hand piling followed by burning, and broadcast burning. All procedures killed the spruce beetle brood in the cull logs and stopped the spread of the outbreak.

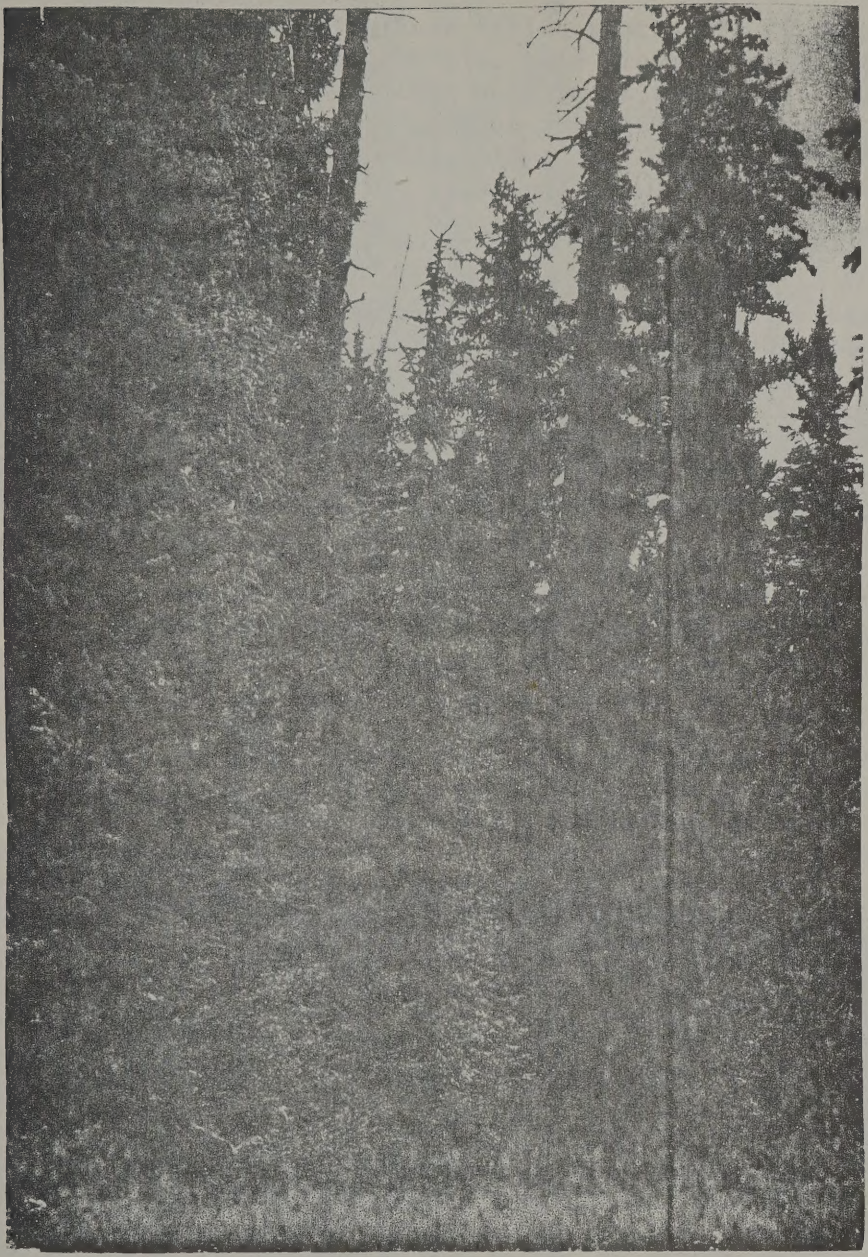


Fig. 4. Engelmann spruce snags killed by spruce beetle around 1850 and still standing in 1961 (center of picture) surrounded by new stand of subalpine fir and Engelmann spruce. Rabbit Ears Pass, Routt National Forest.

Fig. 5. Same general area as Figure 6 but taken in 1965 after the slash had been broadcast burned to kill the spruce beetle in the cull logs. Area seeded with grass in 1963.

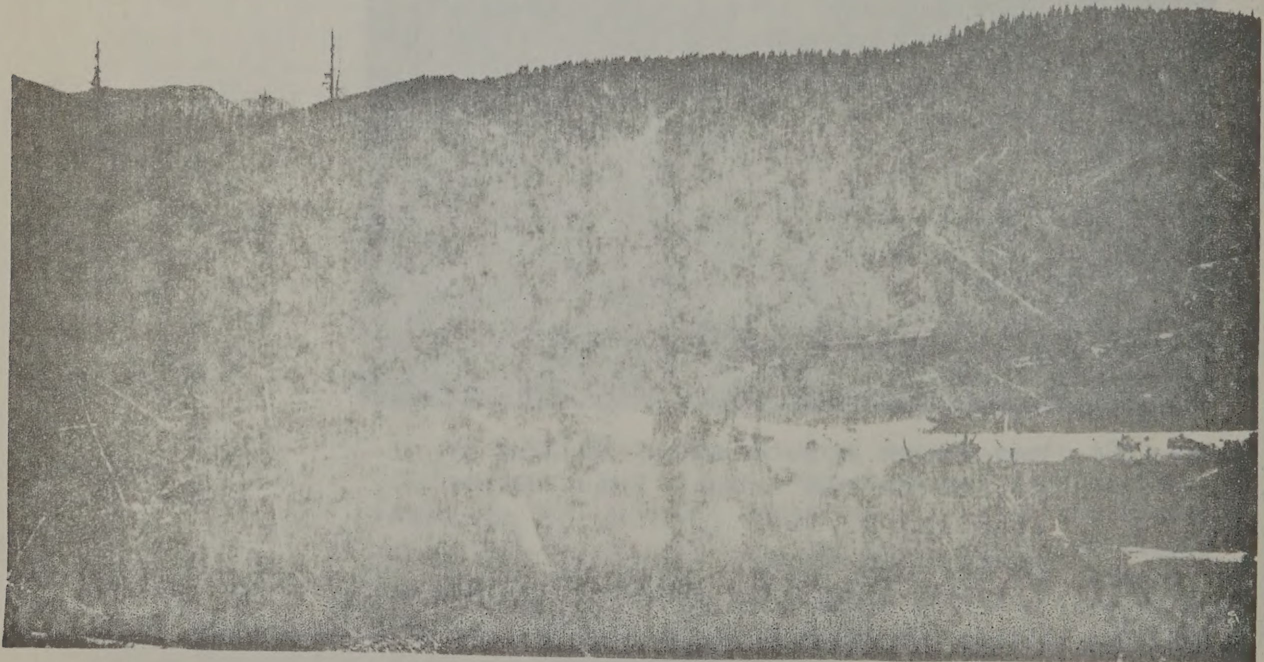


Fig. 6. Clearcut Engelmann spruce stand clearcut and cabled for control of spruce beetle. This was followed by a broadcast burn to kill the spruce beetle in the cull logs. Carson National Forest 1963.

The slash disposal methods reportedly disturbed the soil very little. As a precaution against soil erosion, 5,400 acres were seeded to grass in 1962 and 1963 with good success.

The brush disposal methods killed nearly all of the natural reproduction as well as all potential seed trees. Artificial regeneration of spruce will be most difficult because of the competition with grass and lack of dead material to protect the seedlings from strong drying winds and intense sunlight (Fig. 5).

Alternatives

Protection of Engelmann spruce forests on public lands in the Rocky Mountains is greatly handicapped by the lack of access roads. Success in controlling incipient outbreaks of the spruce beetle is dependent upon early detection and prompt action. The U.S. Forest Service practice of constructing roads along with timber sales results in delayed and costly action.

Greater attention should be given to the long-term goal for management of the Engelmann spruce-alpine fir type. To make the stands less vulnerable to spruce beetle outbreaks, the large areas need to be converted to uneven age stands, either by blocks or within the stands. Additional information is needed to determine the cutting methods required to accomplish that goal (34).

Control of spruce beetle outbreaks by logging followed by broadcast burning should not be done until practical methods for artificial regeneration are assured. Fire has a much greater impact upon the watershed than a beetle outbreak. It is important to realize that while uncontrolled outbreaks have an immediate and drastic impact upon esthetics and the forest environment, an adequate environment is retained in which a new forest is regenerated.

b. Mountain Pine Beetle in Targhee and Teton National Forests and Grand Teton National Park, 1957-1969

The lodgepole pine forests in the Targhee and Teton National Forests and Grand Teton National Park have a long history of recurring mountain pine beetle outbreaks. The current outbreak, the largest on record, started in 1957. Since then approximately three million infested trees have been treated by logging, chemicals, or piling and burning at a cost of 13 million dollars (11). The infestations on the Teton National Forest are under control. Some infestations on the Targhee National Forest are under control; some are being controlled, and others have been abandoned to let the infestations run their course.

The unusually large expenditure and long duration of the control stemmed from underestimation of the magnitude of the infestations. As a result, funds were not adequate to treat all infested trees in all areas in a single year before the annual beetle flight in July and August (11).

Local forest officers and forest entomologists made annual surveys and findings and relayed the information to the Regional Forester, Region 4. The Forest Supervisors called local meetings, attended by private land owners, recreationists, forest industry and dude ranches and other interested people, to study the problem review accomplishments and to advise what should be done.

The control work was done under the concepts and principles contained in the Regional Multiple Use Management Guide and the Ranger District Multiple Use Plans. Protection of the timber values was the primary justification for doing the control work. The logging practices and all operations were scrutinized to protect scenic and recreation values, water quality, wildlife and fish habitat, forage and other values (12,28,29,30).

Impacts considered to be adverse to the forest environment, should the infestations be allowed to run their course, were depreciation of improved campgrounds, organizational and resort sites, and the scenic and natural beauty associated with healthy timber stands; the danger of more and bigger wildfires; and increased wildfire control costs due to insect-killed snags and down timber.

During the period of July 15 to October 15, 1962, 63,000 trees infested with the spruce beetle within 5,500 acres were treated with a total of 26,800 gallons of an ethylene dibromide concentrate in a 1:9 mixture with diesel oil. No detectable amounts of ethylene dibromide were found in water samples taken during spray operations and following heavy rainfall in the area. No adverse effects on the forest environment were reported from the use of ethylene dibromide (Fig. 7). The Colorado River Basin Project on Water Quality made limited studies on the effect of ethylene dibromide on water quality in the Moose Creek Insect Control Unit (25).

Alternatives

Recent research on the habits of the mountain pine beetle in lodgepole pine, although limited in scope, points to the development of some valuable tools for decision-making on control of infestations. Cole and Amman (5) found that the beetle strongly favors the larger trees and that only those trees above 14 inches in diameter produce enough beetles to maintain or increase an infestation (Fig. 8). Amman (1) found that only those trees with thick bark (usually the larger diameter trees) produced large numbers of beetles. Roe and Amman (19) concluded that since the beetle killed the largest and most vigorous trees, the residual stand structure becomes less favorable for rapid tree growth after each infestation. Also, the inferior trees tend to be the parents of the new stand.

A review of the happenings, course of actions, and outcome of the control project, indicates that control decisions were made on inadequate information about the magnitude of the outbreak (number of trees in need of

g. 7. Lodgepole pine infested with mountain pine beetle being sprayed with a water emulsion of ethylene dibromide. Teton National Forest.

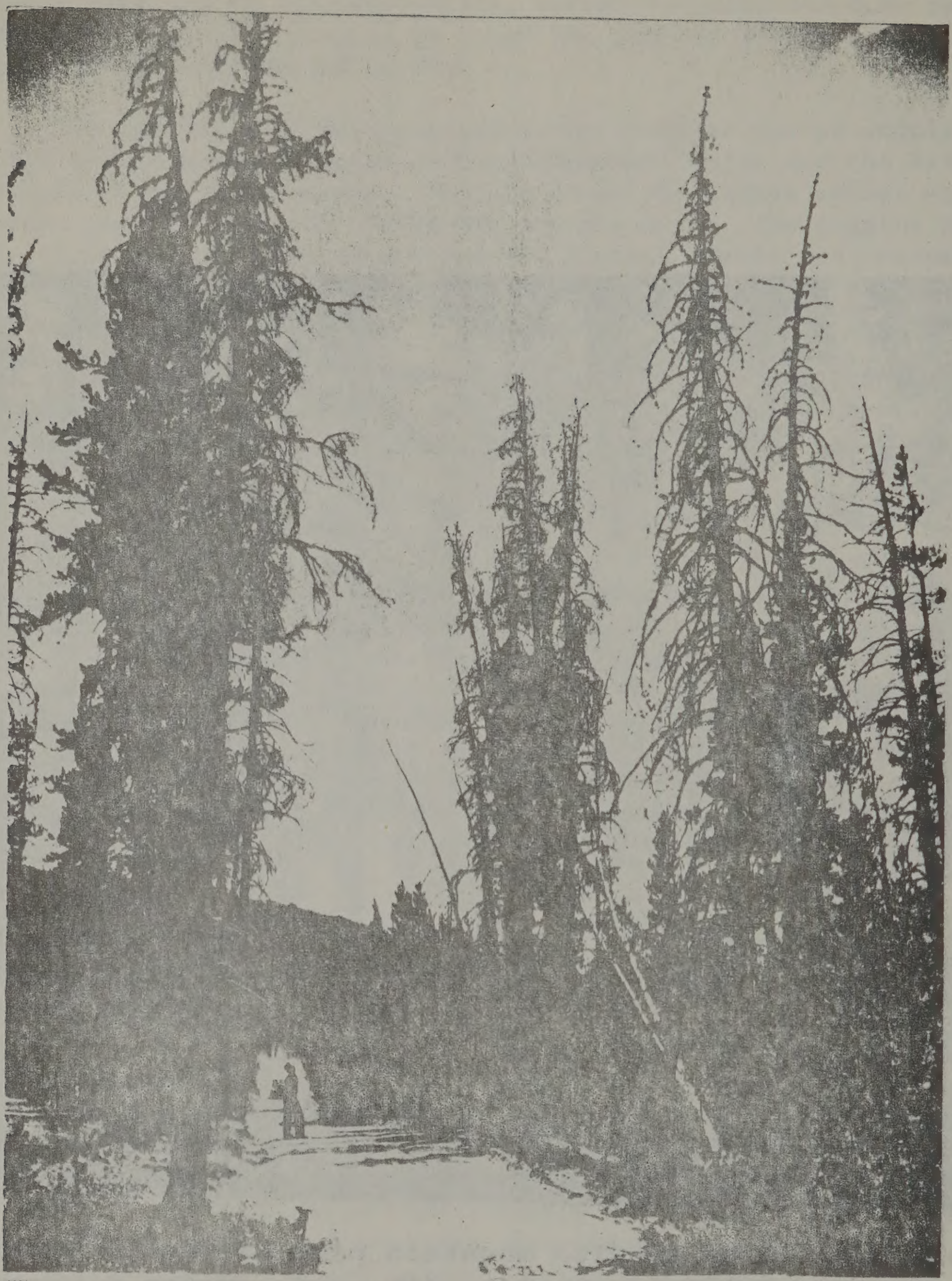


Fig. 8. Typical lodgepole pine stand following a a mountain pine beetle outbreak. Note the young stand of lodgepole pine developing in the understory.

treatment) and about the potential of the beetle to multiply and flourish into a major outbreak. As a result, the operation became more of a delaying action on the course of the outbreak than control (stopping of the outbreak).

Observations and limited research indicate that the forest environment would not have been lost by allowing the outbreak to run its course. Lost would have been the quality and beauty of a healthy and vigorously-growing forest stand. Douglas-fir and subalpine fir would have become a greater component of the forest type in some zones. Loss of the large trees in the stands would have meant less market value and less opportunity to harvest and apply cultural practices needed to regenerate a healthy forest. (Regeneration of a healthy stand in the old overmature forests is dependent upon a clearcut followed by fire, particularly in stands infested with dwarfmistletoe.)

c. The Dwarfmistletoe Problem in Lodgepole Pine

Half of the 15 million acres of lodgepole pine forests, most of which are in federal ownership, are infected with dwarfmistletoe. The parasite reduces growth about one-third in the intermediate and older stands and causes much mortality in the younger stands (7).

Dwarfmistletoe is a parasitic seed plant. The established plant has a network of absorbing strands that gather nourishment from the bark and wood of the pine branches or main stem. Seeds are borne singly in berrylike structures. At maturity the elastic outer cover breaks and flings the seed into the air up to a distance of 35 feet. The seeds that land on pine branches may germinate and send their "roots" into the bark. Older trees with well-developed crowns will not show the effects from the parasite for many years, and growth rate is gradually retarded (Fig. 9). Young trees tend to die more quickly (6). The spread and intensification of the parasite in young stands beyond the limits of seed discharge from an overstory is 10 to 15 feet per decade. Consequently, the spread of the parasite is very slow (8).

Prior to the advent of the white man, wildfires served to regenerate lodgepole pine stands free of dwarfmistletoe. Complete burns eliminated the parasite from large areas. About 50 percent of the lodgepole pine forests are today free of the parasite, but modern day protection of the forests from fires is intensifying the problem.

Cutting practices of the past in which infected non-merchantable trees were allowed to stand and infect the new stands beneath also increased the problem (Fig. 10). In recent years, all cull trees have been destroyed at the time of logging so that the new stands are free of the parasite. A practical method for eliminating the parasite in heavily infected cutover stands is being sought.

Urgently needed is a chemical method for eliminating infections in individual trees without killing the trees (31,32). Such methods are

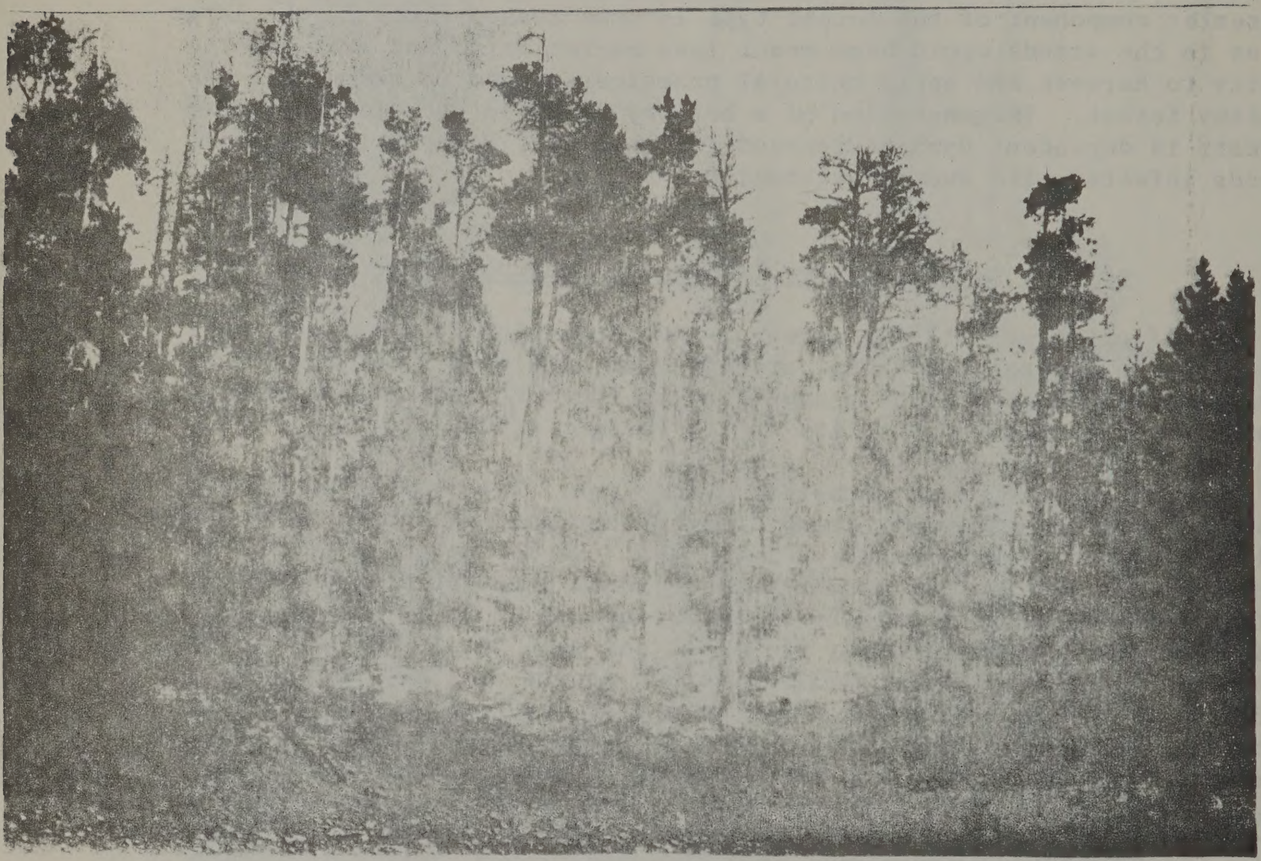


Fig. 9. An old lodgepole pine stand slowly deteriorating from attack of the lodgepole dwarfmistletoe.

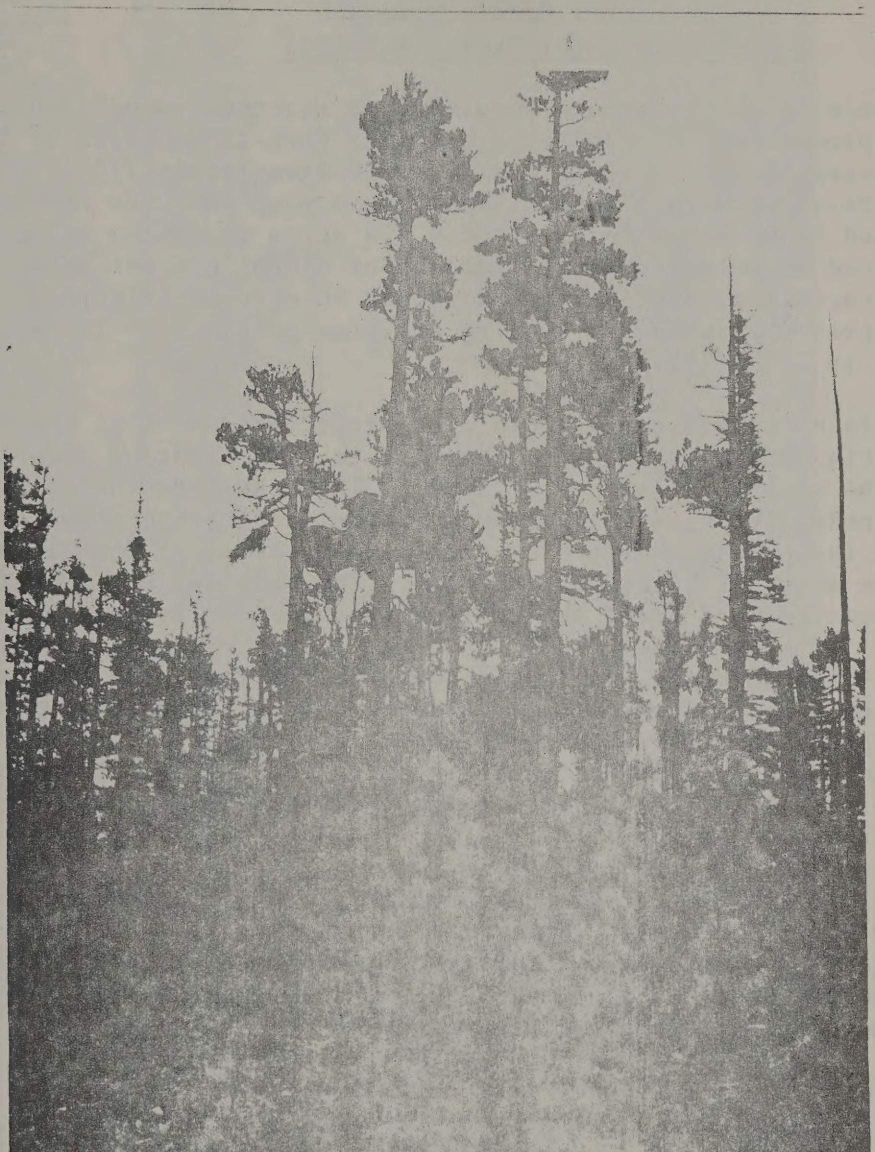


Fig. 10. The new stand of lodgepole pine is heavily infected with dwarfmistletoe due to failure to destroy unmerchantable and infected overstory at time of logging.

especially needed in national parks, such as Yellowstone, where the forests in centers of heavy use are gradually deteriorating from attacks of the parasite.

d. Lodgepole Needle Miner in Yosemite National Park, 1959-1961

An epidemic of the lodgepole needle miner started around 1945 in the lodgepole pine forests in Yosemite National Park (Fig. 11). By 1955 it had spread over 50,000 acres in the Tuolumne River Basin (14). The National Park Service, with technical assistance from the U.S. Forest Service, sprayed 3,400 acres in 1959 and 4,928 acres in 1961. Helicopters applied one pound of malathion in 10 gallons of diesel oil per acre. Sampling of sprayed and unsprayed areas showed 90 percent effectiveness (21,22); the spray prevented top-killing and tree mortality. The outbreak subsided in 1963 (24).

The needle miner kills lodgepole pine after three or more complete defoliations (Fig. 12). Many trees receiving less defoliation succumb to attack by the mountain pine beetle (23). The dead trees decay very slowly in the cold, dry climate. In areas devastated by the miner between 1900 and 1916, the ground is littered with a criss-cross of down logs, but some of the snags still stand (Fig. 13). The National Park Service inspects and removes dead trees that may be hazardous to recreationists.

The 1945-1963 outbreak was in the only area of lodgepole pine accessible by road. Within the infested area were two public campgrounds, two beach and picnic areas, three concession-operated lodges, a lodge operated by the Sierra Club, and numerous hiking trails, including a portion of the John Muir Trail. From 200,000 to 300,000 people per year visit the area.

Between 1945 and the end of the outbreak in 1963 all large trees died in 10,000 acres of forest. While the stocking of young trees beneath the snags is adequate, the recovery of the ecosystem to a mature forest will require many years. Trees may grow no more than 10 to 12 inches in diameter and 60 feet tall in more than 100 years.

The criteria used by the National Park Service for selecting the areas to be sprayed were: (1) amount of development and intensity of public use involved; (2) the current status and expected course of the infestation; and (3) the threat posed by the infested areas to existing or potential high-use areas nearby.

Without control the quality of an environment associated with a mature forest would have depreciated in one of the most heavily used areas of Yosemite National Park.

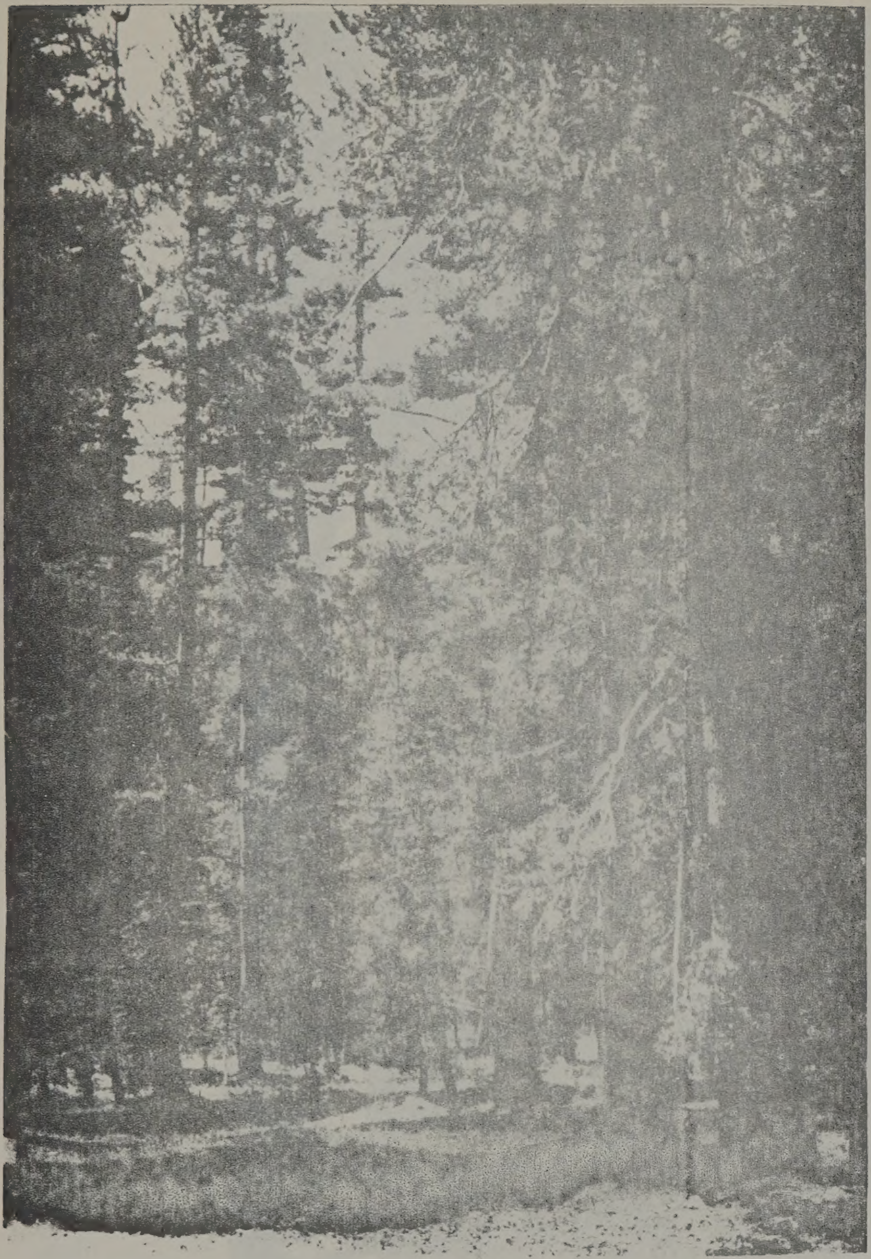


Fig. 11. A normal lodgepole pine forest in Tuolumne River Basin, Yosemite National Park.

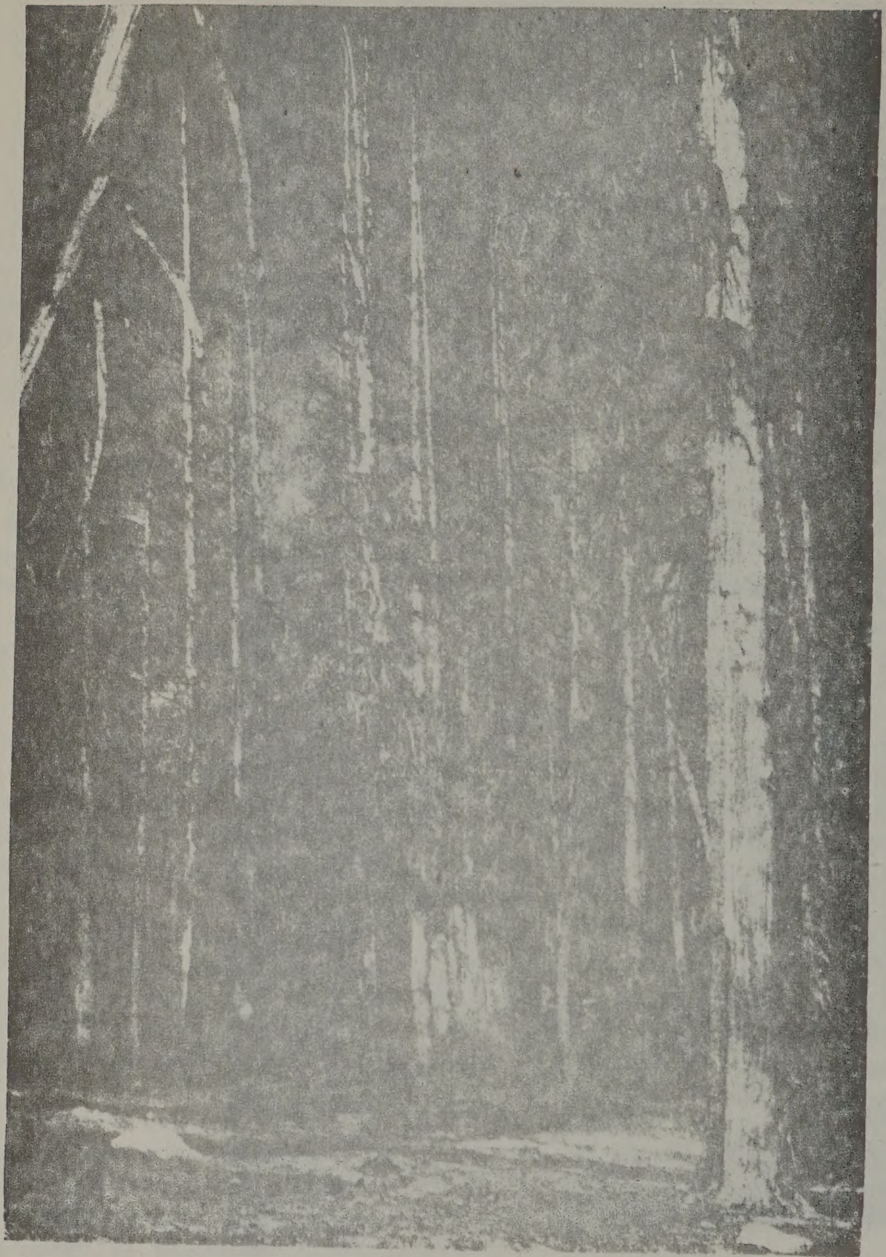


Fig. 12. Lodgepole pine stand killed during the lodgepole pine needle outbreak, 1945-61. Tuolumne River Basin, Yosemite National Park.

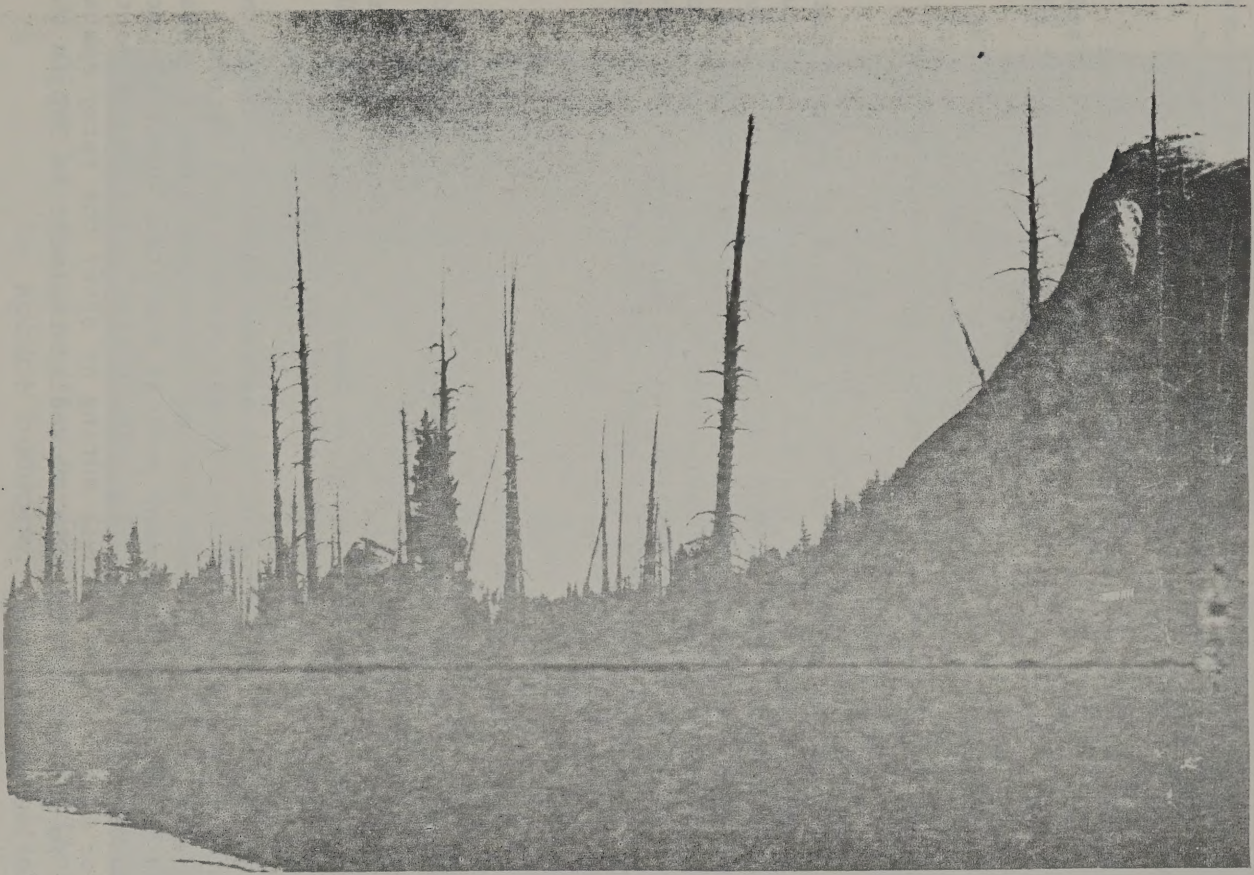


Fig. 13. Lodgepole pine forest killed by lodgepole needle miner during outbreak, 1900-16. Note young stand developing beneath snags after 60 years. Yosemite National Park.

e. Spruce Budworm in Oregon and Washington, 1949-1958

Cooperative aerial spray projects to control the spruce budworm in Douglas-fir and true fir stands in Oregon and Washington were carried out from 1949 to 1955 and again in 1958, over a total area of 4,704,000 acres. The size of the spray areas varied from 68,000 acres to 934,000 acres. Total cost of the projects was $4,608,000 (3,33). Spraying was undertaken only when surveys indicated that heavy defoliation was likely to result in tree killing; it was a stop-gap measure to protect forest values until natural factors again became fully operative. One pound of DDT in one gallon of fuel oil per acre was used, producing an average mortality of the spruce budworm larvae of 98.2 percent. Forest values above 1 billion dollars were reported to have been saved, and severe tree mortality was confined to less than 10,000 acres (Fig. 14).

The spruce budworm control project was the second cooperative project conducted under the Forest Pest Control Act. This project and the preceding one against the Douglas-fir tussock moth in Idaho set the pattern for cooperation in later projects. The cost participation formula provided that public agencies pay the entire cost of treating publicly-owned lands and private owners pay 25 percent of the cost of treating their own lands, with the state bearing 50 percent and the Federal Government 25 percent.

A Spruce Budworm Action Committee (17), composed of representatives from forest managing agencies within the U.S. Departments of Agriculture and Interior, state agencies from Oregon and Washington, universities, forest industries, and interested associations, was formed in fall of 1948. The Committee met annually to review survey findings, make recommendations concerning control, and participate in decision-making. The success of this Committee stimulated the organization of similar committees in other regions of the United States.

Alternatives

The effects of DDT on the forest fauna were not fully understood during the course of the control program. Limited observations made by biologists indicated no acute effects on fish and fresh water arthropods. Later findings led the Federal Government to discontinue the use of DDT and other hydrocarbons for forest insect control on public lands.

The first intensive monitoring of the effects of DDT on the forest environment was administered by the U.S. Forest Service on a spruce budworm control project on the Salmon National Forest in Idaho in 1964 (4). Biologists and chemists from many federal and state agencies participated and measured DDT residue levels. The biologists found no acute losses of fish or warm blooded animals during or after the spray operations, although in general the animals showed an increase in DDT in their fatty tissues following spraying.

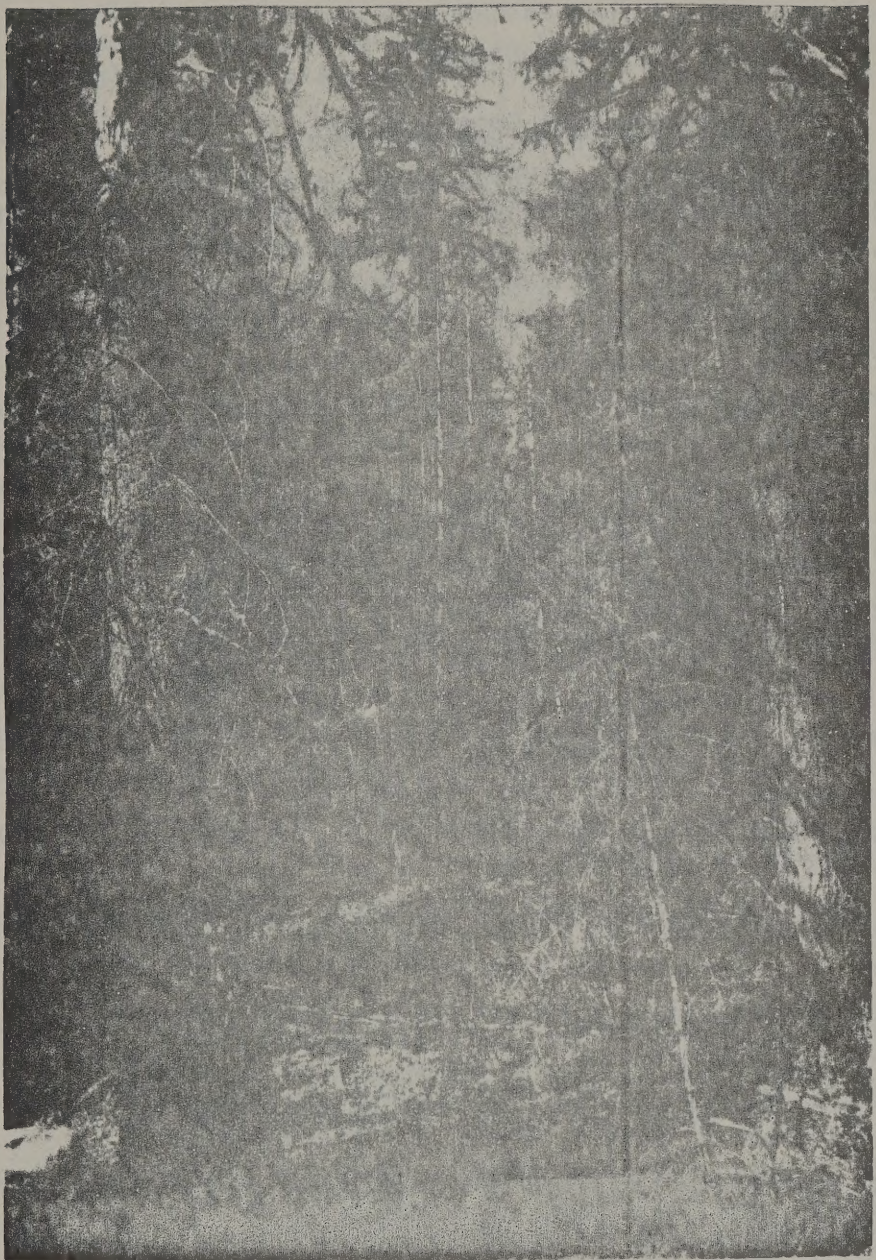


Fig. 14. Douglas fir forest heavily defoliated by spruce budworm.

Satisfactory non-chemical measures for combatting the spruce budworm have not yet been found. Neither has a safe and non-persistent insecticide been found that equals DDT in effectiveness. Fortunately, natural control factors are currently holding damage by the spruce budworm to low levels in the western United States. Should major outbreaks develop, the only choice may be to let the outbreaks run their course followed by a salvage of the killed timber.

2. DISCUSSION

Environmental Consideration

The Forest Pest Control Act authorizes and describes the objectives of insect and disease control on federal lands. The more recent multiple use acts should help insure that objectives and programs of pest control meet the total objectives of management on public forest lands. Pest control at the local levels is part of multiple use plans developed by the on-site managers.

The National Park Service has a long-standing and sound policy toward insect and disease control. Their policy in wilderness areas is:

> . . . Control may be undertaken only with the approval of the Director. The measure of control will depend on a determination of whether the insects or diseases are causing the complete alteration of an environment which is expected to be preserved, but controls will generally be limited to disaster conditions which threaten whole ecosystems. Any controls instituted will be those which will be most direct for the target insect or disease and which will have minimal effects upon other components of the ecosystems of which the wilderness is composed. (2)

The National Park Service policy for other than wilderness areas is:

> Control operations of native insects and diseases will be limited to: (1) outbreaks threatening to eliminate the host from the ecosystem or posing a direct threat to resources outside the area, (2) preservation of scenic values, (3) preservation of rare or scientifically valuable specimens or communities, (4) maintenance of shade trees in developed areas, and (5) preservation of historic scenes. Where non-native insects or diseases have become established or threaten invasion of a natural area, an appropriate management plan should be developed to control or eradicate them where feasible. (2)

The U.S. Forest Service policies and procedures are as follows:

(1) Natural enemies are relied upon to suppress forest pest populations and to keep tree losses at tolerable levels.

(2) Control of bark beetle outbreaks by logging infested trees is used in preference to chemical control wherever feasible and when the harvest methods can be fitted into the local multiple use plans.

(3) Chemicals are used only when evaluation shows that the infestation is increasing, natural factors are not controlling the outbreak, and direct action is necessary to prevent intolerable tree losses.

(4) Cutting practices are designed to convert susceptible overmature and often single-aged stands to younger stands that are more resistant to insect outbreaks and more responsive to silvicultural treatment. (Much research is needed in this area).

(5) Professional personnel in all disciplines of forest land management including experts in game, fish, recreation, watershed management and landscape architecture are employed. Their skills are relied upon to assure that all forest values are considered in reaching control decisions. Methods are often modified to fulfill the requirements of multiple use management.

Some observations of current and past practices of the U.S. Forest Service pertinent to forest pest problems follow:

(1) Surveys are generally not intensive and extensive enough to provide strong data for a precise decision on control by the forest manager. This stems from inadequate funds, insufficient well-trained survey specialists and insufficient knowledge about the habits of many forest pests.

(2) Objectives of proposed control projects are sometimes not adequately defined. Also, the probable impacts upon the forest ecosystem with control and without control are not always fully covered in the survey reports.

(3) The opinions, knowledge and technical assistance of research foresters, entomologists and pathologists frequently are not available to the forest manager in arriving at control decisions. Only a small number of scientists work on pest problems and they often are committed to assigned research projects.

(4) The enactment of the Forest Pest Control Act and the Multiple Use Systained Yield Act and the appropriations implementing

them have made it possible to give due consideration to all forest values in making control decisions.

(5) Entomologists within the agency and biologists in the Fish and Wildlife Service, U.S. Department of Interior, were among the first to consider and recognize possible desirable effects of DDT on aquatic insects, fish, and wildlife. They were detailed in the late 1940's for short periods to pilot control projects and later to large control projects. Their first observations and conclusions were that DDT did kill many aquatic insects in trout streams but that the impact was temporary. However, by the late 1950's and early 1960's more data was accumulated on the subtle effects of DDT on the forest fauna, and Congress appropriated substantial funds to investigate the effects of DDT. At the same time Congress increased appropriations for Fish and Wildlife Service research on the effects of many pesticides on forest fauna and for Forest Service experimentation with promising substitute pesticides and intensified research on natural control methods. Scientists in the two agencies have worked very closely in their investigations.

(6) The Forest Service has discontinued the use of DDT on all public lands. Also, the U.S. Department of Agriculture has withdrawn its publications recommending control of forest and shade tree insects with DDT, in order to revise the recommendations and exclude DDT.

Alternatives

The forest managing agencies might emphasize the following matters:

(1) Improving methods and techniques for measuring, evaluating, and predicting the action of natural control factors, including insect parasites and predators, diseases, avian predators, and weather. This information could be used by the survey entomologists and pathologists to determine more precisely the trends of outbreaks and the need for supplementary control.

(2) Exploring in more depth how the effectiveness of natural enemies can be increased through applied ecology.

(3) Developing safe chemicals for direct control. Especially needed is a replacement for DDT for control of defoliating insects.

(4) Controlling dwarfmistletoes by a safe chemical--a chemical that can be sprayed on the bark of infested trees, is absorbed into the conducting system of the tree, and is translocated to infected branches.

(5) Researching insect attractants to develop completely new control techniques. Direct chemical control measures now in use kill many beneficial insect parasites and predators along with the target insect.

(6) Increasing studies on the silvicultural control of insects and diseases. Each study should have a team of scientists including research silviculturists, entomologists, pathologists and biologists. All pertinent parts of the forest ecosystem would be included in the study.

(7) Increasing research, and reexaminating policy, on the ecological effects of NOT controlling an insect-disease infestation under certain circumstances, rather than relying on the assumption that most infestations must be controlled by logging, spraying or other means.

LITERATURE CITED

1. Amman, G. D., 1969, Mountain pine beetle emergence in relation to depth of lodgepole pine bark. U.S.D.A. Forest Serv. Res. Note Int-96, Ogden, Utah. 7 pp.

2. Berg, L. Y., 1969, Personal communication with L. Y. Berg, Forester, Midwest Region, National Park Service, U.S. Dept. Interior, Omaha, Nebraska.

3. Carolin, V. M., 1969, Impact of spruce budworm on forest environment. Personal communication on file with N. D. Wygant. 2 pp.

4. Casebeer, Robert L., 1965, Monitoring the 1964 spruce budworm aerial spray project, Salmon National Forest. Processed report, Forest Service, United States Dept. Agr., Ogden, Utah. 133 pp.

5. Cole, W. E. and Amman, G. D., 1969, Mountain pine beetle infestations in relation to lodgepole pine diameters. U.S.D.A. Forest Serv. Res. Note Int-95, Ogden, Utah. 7 pp.

6. Gill, L. S. and Hawksworth, F. G., 1964, Dwarfmistletoe of lodgepole pine. U.S. Dept. Agr. Forest Pest Leaflet 18. 7 pp.

7. Hawksworth, F. G., 1958, Survey of lodgepole pine dwarfmistletoe on the Roosevelt, Medicine Bow, and Bighorn National Forests. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Station Paper No. 35. 13 pp.

8. Hawksworth, F. G. and Graham, D. P., 1963, "Spread and intensification of dwarfmistletoe in lodgepole pine reproduction." Journal of Forestry 61:587-591.

9. Hawksworth, F. G. and Hinds, T. E., 1964, "Effects of dwarfmistletoe on immature lodgepole pine stands in Colorado." Journal of Forestry 62:27-32.

10. Impson, John W., 1964, "Engelmann spruce beetle project accomplishment report." Typewritten report on file at U.S. Forest Service, Albuquerque, N. Mexico. 19 pp.

11. Iverson, Floyd, 1969, Environmental impacts caused by the mountain pine beetle Targhee and Teton National Forests. Personal letter to N. D. Wygant, Dec. 10, 1969, from U.S. Forest Service, Ogden, Utah.

12. Kincheloe, John J., 1967, "State II Multiple use survey report, mountain pine beetle control project fiscal year 1968." Targhee National Forest. Mimeographed report on file U.S. Forest Service, Ogden, Utah. 7 pp.

13. Knight, F. B., 1958, "The effects of woodpeckers on populations of the Engelmann spruce beetle." *Journal of Economic Entomology* 51:603-607.

14. Koerber, Thomas W., 1969, Impact of lodgepole needle miner on recreation values. Personal communication to N. D. Wygant, Dec. 8, 1969. 2 pp.

15. Love, L. D., 1955, "The effect on streamflow of the killing of spruce and pine by the Engelmann spruce beetle." *Transactions American Geophysical Union* 36:113-118.

16. Massey, C. L. and Wygant, N.D., 1954, *Biology and control of the Engelmann spruce beetle in Colorado*. U.S.D.A. Circular No. 944. 35 pp.

17. McKinley, Charles, 1965, The Northwest Forest Pest Action Committee (Council). *The Management of Land and Related Water Resources in Oregon*. A case study in administrative federalism, Chapter 7, pp. 126-165.

18. Nagel, R. H., McComb, David, and Knight, F. B., 1957, "Trap tree method for controlling the Engelmann spruce beetle in Colorado." *Journal of Forestry* 55:894-898.

19. Roe, A. L. and Amman, G. D., 1969, *The mountain pine beetle in intermountain lodgepole pine forests*. Typed manuscript on file with authors, U.S. Forest Service, Ogden, Utah.

20. Ronco, Frank, 1961, *Planting in beetle-killed spruce stands*. U.S.D.A. Forest Serv. Res. Note RM-60, 6 pp. Rocky Mountain Forest and Range Experiment Station.

21. Stevens, Robert E. and Struble, George R., 1960, *Entomological phases of the 1959 lodgepole needle miner control project in Yosemite National Park*. Mimeographed report U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station. 24 pp.

22. Stevens, Robert E., 1962, *Entomological phases of the 1961 lodgepole needle miner control project in Yosemite National Park*. Mimeographed report U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station. 43 pp.

23. Struble, George R., 1958, *Lodgepole needle miner*. U.S. Dept. Agr. Forest Pest Leaflet 22. 7 pp.

24. Struble, George R., 1965, "Effect of aerial sprays on parasites of the lodgepole needle miner." *Journal of Economic Entomology* 58:226-227.

25. U.S. Dept. Health, Education & Welfare, 1963, *Studies of the effects of forest insect control with ethylene dibromide on water quality*. Mimeographed report on file U.S. Forest Service, Ogden, Utah, June, 1963. 17 pp.

26. U.S. Forest Service, 1952, Saving the trees beyond. Processed report U.S. Forest Service, Denver, Colorado.

27. U.S. Forest Service, 1953, Engelmann spruce bark beetle control Project, Colorado, 1950-1952. 11 pp. Mimeographed report U.S. Forest Service, Denver, Colorado.

28. U.S. Forest Service, 1965, Policy for the control of current mountain pine beetle infestations on the Teton National Forest. Mimeographed report on file U.S. Forest Service, Ogden, Utah. 5 pp.

29. U.S. Forest Service, 1967, Policy for the control of the current mountain pine beetle infestation, Targhee National Forest. Mimeographed report, May 3, 1967, on file U.S. Forest Service, Ogden, Utah. 13 pp.

30. U.S. Forest Service, 1967, Lodgepole pine bark beetle infestations in the Intermountain Region. Targhee National Forest 1967-68 Control project. Printed brochure on file U.S. Forest Service, Ogden, Utah.

31. U.S. Forest Service, 1967, An administrative study plan for development of dwarfmistletoe control through use of selective herbicides. Mimeographed report on file U.S. Forest Service, Ogden, Utah. 4 pp.

32. U.S. Forest Service, 1969, Program analysis for research and development on western dwarfmistletoes. Mimeographed report on file U.S. Forest Service, Fort Collins, Colorado. 36 pp.

33. Whiteside, J. M., 1956, "Spruce budworm control in Oregon and Washington, 1949-1956." Proceedings Tenth International Congress of Entomology, Montreal, Canada, 4:291-302.

34. Wygant, N. D., Gill, L. S. and Buell, J. H., 1955, Tree killing bark beetles, general information. Memorandum to Director, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 10 pp.

35. Wygant, N.D., 1956, "Engelmann spruce beetle control in Colorado." Proceedings Tenth International Congress of Entomologists, Montreal, Canada, 4:181-184.

36. Wygant, N. D., 1965, "Relics of Engelmann spruce beetle outbreaks in Colorado." Talk presented at annual meeting Entomological Society of America, New Orleans, La., Dec. 1965.

37. Yeager, Lee E. and Riordan, L. E., 1953, "Effects of beetle-killed timber on range and wildlife in Colorado." Transactions 18th North American Wildlife Conference. pp. 596-616.

38. Yeager, Lee E., 1955, "Two woodpecker populations in relation to environmental change." Condor 57:148-153.

STUDY OF ENVIRONMENTAL PROBLEMS
ON THE PUBLIC LANDS

CASE STUDY NO. XI

SANTA BARBARA OIL SPILL

FOR THE

PUBLIC LAND LAW REVIEW COMMISSION

by

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1. RECITATION OF THE FACTS

Men have known about oil in the Santa Barbara Channel for centuries. Indians and Spanish explorers used the tar and asphalt that seeped from the Channel floor for caulking their boats,[1] and oil has been a feature of the Channel, particularly around what is called Coal Oil Point, ever since.[2]

Oil from Channel tidelands was refined in the mid 1890's just east of Santa Barbara. More than 400 wells were drilled from ocean piers -- the first known off-shore production in the United States.[3] In the late 1920's Channel oil was being produced from tideland piers in the Ellwood field to the west.

During that same post-war period, oil development began on shore that was to have great significance for future Channel oil operations. By 1928 there were more than 100 wells in Ventura, east of Santa Barbara, yielding large oil and gas deposits.[4] The Ventura field was later found to be a part of one of the most prominent faulted anticlines beneath the Channel, the Rincon trend, a structure that has "completely dominated the /oil and gas/ production statistics of all the other channel-region fields combined," [5] and which included the off-shore field where Union Oil Company's well A-21 (on Platform A) erupted -- causing the Santa Barbara oil spill of January 28, 1969.

1/ Yerkes Wagner, and Yenne, "Petroleum Development in the Santa Barbara Channel Region," _Geology, Petroleum Development, and Seismicity of the Santa Barbara Channel Region, California_, Geological Survey Professional Paper 679, 1969, at 13.

2/ _Estimates of Surface Pollution Resulting from Submarine Oil Seeps at Platform A and Coal Oil Point_, General Research Corporation Technical memorandum 1230 prepared for Santa Barbara County (November, 1969) at 21.

3/ Yerkes, _supra_ note 1, at 18.

4/ _Id_. at 16.

5/ _Id_. at 21. The Rincon trend is an intensely folded and faulted subsea structure. Its general eastward plunge is illustrated by the fact that the Dos Cuadras filed, at the west, one particular formation (Repetto, from which Union's Dos Cuadras oil came) is exposed at the sea floor, while further east, in the Carpenteria field, this formation is at 2,000 feet, and even further east, where the Rincon trend goes beneath the shoreline, the formation is at 6,700 feet. _Id_., 15.

In 1938 California passed the State Lands Act, authorizing oil leasing in state tidelands out to the three-mile limit. Soon after World War II several major oil companies, including Union, made extensive geological, geophysical and seismographic studies of the Channel floor with state permits. By the early 1950's Santa Barbara residents and other state conservationists were concerned about preserving the scenic shoreline view, and in 1955 the state created an off-shore sanctuary out to the three-mile limit and for 16 miles along the Santa Barbara coast.[6] Henceforth state leasing in the sanctuary could be permitted only if the State lands Commission found that the oil was being drained from outside the three-mile limit and that leasing would be in the state's "best interests."[7]

During the next ten years state Channel leasing accelerated. The first off-shore platform (Hazel) was constructed in 1958 just two miles from Summerland, serving what proved to be a rich oil and gas deposit. A second state platform (Hilda) went up nearby in 1960. That same year nearly 50 wells were completed from an artificial island southeast of Carpenteria, tapping oil from the Rincon trend. In 1961 the first ocean floor oil completions were made in the same area in about 55 feet of water. By 1965 the state had leased nearly all state shelf lands outside the sanctuary between the Ventura County line and Point Conception.[8] The state had learned a great deal about oil in the earthquake-prone Channel floor through its supervised core drillings, but in accordance with state law this information was never conveyed to the federal government.[9]

6/ Cunningham-Shell Tideland Act, §6871.2 Calif. Public Resources Code (1955).

7/ Section 6872 Calif. Public Resources Code (1955).

8/ At the time of the spill there were 159 oil and 12 gas wells producing on state lands, with 8 platforms, 4 underwater completions, 12 on-shore processing plants and 5 marine terminals. Total state revenue from these and other offshore leasing has come to $800,000,000 at about $50,000,000 per year. See Hearings on S.7 and S.544 Before the Sub-committee on Air and Water Pollution of the Senate Public Works Committee, 91st Cong., 1st Sess., Ser. 2, Pt. 3, (1969) at 481. These leases "produced 1.1 billion barrels of crude oil, or about 7.5 percent of California's cumulative production" by the end of 1968, Yerkes, supra note 1, at 13.

9/ Hearings on S.7 and S.544 supra note 8, at 477-479. See also, Hearings on S.1219 Before the Subcommittee on Minerals, Materials and Fuels of the Senate Interior Committee, 91st Cong., 1st Sess., (1969) at 70, 71.

Federal involvement in Channel leasing began soon after the U.S. Supreme Court decided U.S. v. California[10] in 1965, which rejected state claims to Channel lands beyond the three-mile limit. The Interior Department immediately embarked on a "twin" coring program to enable new oil companies to match the knowledge previously gathered in these (now federal) outer shelf lands by other oil companies under state permits. By encouraging this the government hoped that when bidding was finally announced no interested oil company would be at a competitive disadvantage.[11] Federal leasing procedures were speeded up when the state granted leases just within the three-mile limit (Platforms Hope and Heidi) in the Carpenteria field in 1966. Late that year Secretary Udall authorized the lease-sale of one federal tract (1,995) acres) to forestall subsurface oil drainage from these adjacent state platforms. Phillips Petroleum bid $21,000,000 and was awarded this initial outer shelf drainage tract in December, 1966. A week later the Bureau of Land Management asked oil and gas companies to nominate the Channel tracts they wanted to bid for in a general leasing sale.

Santa Barbara County officials, municipal leaders and local conservationists opposed these federal plans. Early in 1967 they began negotiations with Interior's Assistant Secretary for Mineral Resources to insure that federal drilling would not stimulate state oil drilling in the state oil free zone (the sanctuary). County spokesmen asked for a federal sanctuary beyond the three-mile limit to protect the ocean view and a one-year federal leasing moratorium to permit further study of oil pollution hazards. While these negotiations with Interior proceeded throughout 1967, oil companies, who opposed the County proposals, conducted their own exploratory surveys of the Channel's federal tracts and invested $150,000,000 in the process.[12]

That fall Interior announced that it would prohibit all leasing in a two-mile buffer zone adjacent to the state sanctuary. The County then requested a six-month leasing delay to study the Interior plan. Secretary Udall agreed to a sixty-day delay, postponing the call for bids until December. In November the County urged the creation of a larger buffer zone than Interior had proposed (it was to include the area of the future

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[10] 381 U. S. 139 (1965).

[11] Letter from Frank J. Barry, Solicitor, Department of the Interior, to Thomas C. Lynch, Attorney General, State of California, July 29, 1965.

[12] Hearings on S.1219, supra note 9, at 48.

Platform A), a general reduction in leasing acreage and fewer platforms. The oil companies strenuously objected, [13] and Interior went along with industry: in December, 1967, the Department announced a competitive lease sale of 500,000 acres of Channel lands. (Bidding notices did require platforms to be large enough for 20 or more wells, be camouflaged, and designed to help protect esthetic values.)

In November, 1967, prior to this Interior action, the Army Corps of Engineers held public hearings in Carpenteria on the application by Phillips Petroleum for approval of its drainage tract platform.[14] Testimony during this one-day hearing covered esthetic, geophysical, pollution and fish and wildlife aspects of the proposed platform, in addition to navigational matters. Local opposition was especially concerned about earthquake hazards, as well as esthetics. The following January the Corps granted the permit, and platform construction began.

In February, 1968, Interior finally held its general lease sale on Channel lands, accepting $603,000,000 for leases on 71 tracts (363,000 acres). A combination of Union Oil, Texaco, Gulf and Mobile offered a record bid of $61,400,000 for Tract 402 in the Dos Cuadras field. Union was named operator of the lease. By March, Union had discovered oil, and in May it requested Corps permission for platform construction. The permits were obtained several months later without a Corps hearing.[15] In discussions between Union and the U.S Geological Survey, it was agreed that Union's Platform A should be designed for 56 separate wells.

As early as February, 1968, natural seeps were reported from the Channel floor about 100 feet west of the future site of Platform A.[16] When core samplings were taken at the site, just before platform construction, oil saturation was noted 30 feet below the mud line,[17] and while the platform was being emplaced in September, 1968, gas was noticed bubbling up through the ocean in that area.[18] During the drilling of the first four development wells, including the notorious A-21, the permeable quality of the unusually thin 300 foot layer of capping-strata (lying between the ocean bottom and the shallowest major oil reserve) was again illustrated; in each case drilling mud and cement was repeatedly lost into this region.[19]

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[13] Letter from P. F. Sollars, Chairman, Exploration Committee, Western Oil and Gas Association to Stewart Udall, December 2, 1967.

[14] Corps of Engineers Public Hearings on Permit Application by Phillips Petroleum Company on Proposed Drilling Platform Hogan at Carpenteria, California, November 20, 1967.

[15] On June 12, 1968, the City of Santa Barbara requested a Corps public hearing (not otherwise required) on Union's application, protesting that (1) it posed a potential danger to water and air navigation, (2) it would be ugly to residents of the city, and (3) underwater facilities were possible. Some weeks later, however, on July 11, 1968, the city withdrew its hearing request while reasserting its objections. See Senate Hearings on S.7 and S.544, supra note 8, at 546-548. The County of Santa Barbara did not respond to the Corps notice of permit application. Id. at 540.

[16] McCulloch, "Geologic Characteristics of the Dos Cuadras Offshore Oil Field," Geology, Petroleum Development and Seismicity of the Santa Barbara Channel Region, California, Geological Survey Professional Paper 679, (1969) at 43.

By January, 1969, the USGS had approved five development wells on Platform A. Three had been sunk and sealed by then, and the fourth (A-21) and fifth wells were drilled that month. For each of these wells, Union obtained from the United States Geological Survey Regional Supervisor a variance on the usual well casing requirements.[20] Union obtained permission to set one string of conductor (20") casing to only 15 feet below the ocean bottom (as opposed to the usual USGS requirements of at least 500 feet) and, more importantly, to set smaller surface casing (13 3/8") to 238 feet below the floor (as opposed to the 861 foot minimum requirement of USGS).[21] Below the casing point, therefore, there was nearly 3,000 feet of uncased, open hole. This was apparently permitted because the first major oil reservoir was so shallow, just 20 feet below the casing point, and the first competent bed to which additional surface casing could be anchored was at nearly 1,400 feet -- deeper than the usual casing.

On January 28, 1969, three wells (all with the casing variance) had been successfully drilled, completed and shut in, pending pipeline completion. That day the fourth well (A-21) was drilled to its total depth of 3,479 feet from the platform, reaching the major oil deposits beneath the 3,000 foot level. The drill crew[22] then began to pull the drill out.

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[17] *Id.* at 33.

[18] Id.

[19] Id.

[20] The usual casing requirements were set forth in OCS Order No. 2, USGS, March 31, 1965.

[21] The minimum surface casing for wells down to 7,000 feet was 25 percent of the proposed total depth. *Id.*

[22] The drilling crew consists of five men, including the driller, all of whom live and work on the platform while drilling takes place, 24 hours a day. The drill crew for A-21, as for the other wells from Platform A, were employees of Peter Bawden Drilling Company, drilling contractor to Union Oil Company.

The first five stands of pipe (a stand being a 90 foot length of pipe with three 30 foot joints) pulled "tight," meaning that (as weight indicators would have shown) the driller was pulling more than the weight of the pipe, and the next three stands pulled free.[23] The drill was either pulled up too fast or the drill bit was clogged with cuttings so that it sucked drilling mud from the bottom of the hole, reducing the mud pressure used to keep oil and gas out. (Oil and gas pressure at the bottom of the hole was at 1,660 psi or less.[24]) This pressure reduction caused the gas, previously in solution with the oil, to expand and enter the drill pipe through the drill holes, lighten the mud and send it to the platform surface. Then the gas itself exploded on up to the platform. There "for 13 minutes the well blew blinding gaseous mist in large volumes with a deafening roar."[25]

While the well blew, the drill crew tried unsuccessfully to shut the blowout preventer (a series of safety valves on the platform). Finally, fifteen minutes after the blowout had begun, the crew dropped the drill pipe part way down the hole and managed to shut the blowout preventers at the surface, "thereby abruptly confining the low-density condensate fluid to the largely uncased well bore."[26] Pressure then built up below the surface casing. High pressure fluid from the bottom of the well quickly came up the hole to this point, pressurized the shallowest oil strata, and entered the thin layer of porous, permeable cap rock. It was not long before gas, then oil, began to erupt from the Channel floor; the first oil eruption appeared from 1½ to 2 hours after the blowout preventers were shut, some 800 feet east of the platform.[27] "Within 24 hours oil and gas were seeping vigorously from numerous ocean-floor sources along an east-west zone extending from a point about 250 feet west of the platform to a point about 1,050 feet east of the platform."[28] The well was clearly out of control below the surface.[29]

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[23] Geology, Petroleum Development, and Seismicity of the Santa Barbara Channel Region, California, Geological Survey Professional Paper 679, 1969, Appendix A, at 71.

[24] McCulloch, supra note 16, at 40.

[25] Id.

[26] Id.

[27] Id.

[28] Id.

[29] To put the spill in statistical perspective, of the 10,000 well completions in the Outer Continental Shelf, there have been 25 blowouts reported to USGS. Six were controlled in less than an hour, another six in less than a day, another four in less than two days, another four in less than two weeks (including Santa Barbara), and another five in more than two weeks (the longest being three months). Seventeen of these were gas only, four were oil only, and four were gas and oil. Hearings on S.1219, supra note 9, at 68.

The Coast Guard, alerted to the spill the previous day, took charge of cleanup on January 29, under the National Multi-Agency Oil and Hazardous Materials Pollution Contingency Plan. That same day Union assumed full financial responsibility for the cleanup. The company obtained the Interior Department's conditioned approval to use chemical dispersants and on January 30, it aerially applied Corexit 7664[30/] to the slick. For two days some 8,085 gallons of dispersants were used, none nearer than one mile from shore,[31/] but on February 1 the Federal Water Pollution Control Administration asked that dispersants be curtailed and used primarily to prevent fire around the platform.[32/] Subsequent testing indicated that the dispersants were of doubtful effectiveness.[33/]

By February 1 oil had already hit many Santa Barbara beaches and was continuing to arrive as efforts to control the well failed.[34/] Experiments with plastic booms, log-type booms, cement and other chemicals were all tried without success. By February 4 and 5 crude oil heavily covered most Santa Barbara beaches. Hundreds of tons of straw were ordered, along with three straw mulchers; a work force was employed that peaked at nearly 1,000 men.[35/]

[30/] Corexit 7664 is produced by the Enjay Chemical Company, a subsidiary of Standard Oil. A small amount of Guardian Chemical Company's Polycomplex A-11 was also used at this time. Both were applied at the rate of 40 gallons per acre at full concentration (40 percent active material). Gains, Pollution Control at a Major Oil Spill, Union Oil Company (1969), at 3.

[31/] Id. at 3, 4.

[32/] Id. at 4.

[33/] Tests of the effectiveness of Corexit and Polycomplex were made in the Channel on February 9, 1969. "It was concluded that the dispersants tested were not significantly better than the mechanical mixing energy supplied by a boat's propellers when attempting to break up an oil slick in open sea." *Id.* at 11.

[34/] The drill bit was clogged, making it impossible to send mud or cement into the hole, and the drill pipe itself was stuck and would not come out. Geological Survey Professional Paper 679, supra note 23, at 71.

[35/] Gains, supra note 30, at 9. As late as May, 1969, oil companies maintained a daily force of 300 men to clean up the beaches. Hearings on S.1219, supra note 9, at 93.

On February 7 A-21 was finally closed. After a massive effort to obtain sufficient mud, cement and equipment and after pumping 13,000 barrels of mud into the hole, the well was killed.[36] Nevertheless, seepage continued from the ocean floor, covering an area of about 50 acres.[37] That same day Secretary Hickel ordered all production and drilling in federal channel waters stopped. (Although the Secretary requested that all drilling be halted on February 3, he withdrew the request on February 4.[38])

Within two months of the spill, more than 100 miles of beaches were hit by oil in varying degrees of severity.[39] The quantity of oil spilled, however, was disputed. One expert estimated that by the middle of May, 1969, some 3,250,000 gallons had erupted[40] (compared with the 30,000,000 gallons from the Torrey Canyon, that grounded off the coast of England.[41])

This estimate by Alan A. Allen, a marine scientist of General Research Corporation, was substantially larger than the estimates from USGS and Union Oil. During the first 10½ days before the well was killed and when seepage was heaviest, Union and USGS observers recorded seepage of 500 barrels[42] per day (bpd).[43] (The Director of USGS stated that seepage was from 300 to 500 bpd.[44]) Allen considered 5,000 bpd a "very conservative" estimate.[45] USGS estimated the total seepage by March 20, 1969, at between 3,000 to 6,000 barrels; Allen estimated 60,000 barrels.[46] By October, 1969, when seepage rates had decreased, Allen's estimate of 10 bpd [47] was at least close to the estimates of USGS for September, [48] but by that time spill discrepancies had helped discredit Interior and Union in the eyes of the local public.

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[36] The stuck drill pipe had been perforated by a milling gun at more than 2,584 feet below the ocean floor to allow mud and cement to reach the bottom of the hole. Geological Survey Professional Paper 679, supra note 23, at 72.

[37] McCulloch, supra note 16, at 43.

[38] Department of the Interior Press Releases, February 3 and 4, 1969.

[39] See maps, Hearings on S.1219, supra note 9, at 150.

[40] Hearings on S.1219, supra note 9, at 152.

[41] For details on the Torrey Canyon disaster see, The Torrey Canyon: Report of the Great Britain Committee of Scientists on the Scientific and Technological Aspects. (H.M.S.O. 1967)

[42] One barrel equals 42 gallons.

[43] McCulloch, supra note 16, at 44.

[44] Hearings on S.1219, supra note 9, at 48.

[45] Id. at 149.

[46] Id. at 152.

47/ Estimates of Surface Pollution, supra note 2, at 19.

48/ McCulloch, supra note 15, at 45. The attempt by McCulloch to explain the differences in spill estimates does not rebut Allen's figures for several reasons.
(1) Whereas McCulloch says that Allen's estimates were "based primarily" on aerial reports of the slick by the U.S. Coast Guard (at 44), Allen stated that his estimates were obtained from independent aerial surveys that were "in close agreement with estimates made by the U.S. Coast Guard and other independent observers." (Hearings on S. 1219, supra note 9, at 147.)
(2) McCulloch then cites a study of J.M. DeNoyer of USGS: "Between March 1 and March 22, 1969, the Geological Survey conducted a number of high and low altitude detailed aerial photographic missions to determine the extent of oil distribution and dynamic characteristics of oil movement. . . . Maps prepared from these photographs indicate that an overestimate of the volume of oil is obtained from the extent of the slick. The degree of overestimation ranges between a factor of four and 10, depending on wind and current conditions and the rate of leaking. Reducing Allen's estimates of about 5,000 bpd by a factor of four would give an estimate of 1250 bpd and a reduction by a factor of 10 would suggest 500 bpd." (at 44, emphasis added.) DeNoyer does not indicate on what basis it can be stated that USGS photographs "overestimated" the spill. No independent data from collecting sources on the channel floor, for example, could have been available, since these devices were first installed the day aerial mapping was completed, March 22.
(3) Believing that the 500 bpd figure might be too conservative for the 10½ day period, DeNoyer notes that a rate of over 1,000 bpd would be "consistent with Allen's mapping of the maximum extent /of the spill/ when the degree of oil coverage is taken into consideration." (at 44.) Allen, however, had considered this factor having estimated actual oil coverage of the spill areas at 75 percent after two days, and significantly less during the remaining 8½ days before the well was killed. Hearings on S.1219, supra note 9, at 148.
(4) Finally, McCulloch reported that in September Allen reduced his 200 bpd figure for the period between March 22 through July 13, 1969. Allen's revised estimate, however, was given for September only, when the rate of spill had been greatly reduced. (Interview with Alan A. Allen, Santa Barbara, December 11, 1969.)

On February 17, Interior announced new regulations for outer-shelf operations that provided for absolute liability of existing lessees for oil pollution cleanup.[49] That same month Presidential Science Advisor, Dr. Lee A. DuBridge, named a panel of 14 experts to study the problem of oil spills, and on the panel's recommendation Secretary Hickel gave Union permission to perforate other Platform A wells and conduct temporary pressure relief pumping.

Also in February USGS began a scientific study of the Channel, in cooperation with the State of California, to investigate the nature of the Channel floor and the need for new drilling procedures.[50] Partly as a result of this study Interior announced new drilling regulations in March,[51] covering such matters as safety and pollution control, equipment, testing procedures, and more stringent casing requirements[52] and variance procedures. The order announced the creation of a permanent ecological sanctuary in the Channel (the previously sought two-mile buffer zone) and an adjacent buffer zone beyond. In March, Secretary Hickel also asked Union Oil and other oil companies to supply Interior with geological, geophysical and structural information normally regarded as proprietary and withheld from the government. The Secretary assured the companies "that proprietary information will be safeguarded and not released for public inspection."[53]

In April the Secretary authorized resumption of drilling and production on five Channel leases[54] under new regulations. That same month President Nixon asked Dr. DuBridge to assemble a second panel of experts to recommend measures to contain the Santa Barbara spill.[55] While the shutdown order continued on 67 leases, including Union's Platform A, this second DuBridge panel recommended in June a resumption of drilling as the best cure for continued seepage.[56]

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[49] 34 Fed. Reg. 2503, February 21, 1969. These regulations were subsequently modified and amended, 34 Fed. Reg., 13547, August 22, 1969.

[50] Hearings on S.1219, supra note 9, at 45.

[51] OCS Order No. 10, March 21, 1969.

[52] According to John R. Fraser, Vice President of Union Oil, additional casing in A-21 might have contained the spill. "Had we had such a string of casing, it is probable that we would not have had the well come up through the ocean floor." (Hearings on S.7 and S.544, supra note 8, at 572.) New Interior regulations now provide for minimum conductor casing at 300 feet below the ocean floor, and surface casing to a minimum depth of 1,000 feet below the ocean floor. OCS Order No. 10, March 21, 1969.

[53] Telegram from Walter Hickel to Fred Hartley, March 3, 1969.

[54] One of these fortunate lessees, Humble Oil Company, reported in July that it had made a major oil discovery in the Channel in an area previously considered disappointing. The Wall Street Journal, July 10, 1969.

Reserving immediate action on the panel report, Secretary Hickel announced in early August that limited shallow drilling and cement injection processes (along with the installation of large underwater collecting tents) had indeed accounted for a reduced seepage around Platform A.[57] A few weeks later the Secretary endorsed the theory of the second panel's report and announced that Sun Oil Company could resume drilling and the construction of a new platform on its lease, from which about one-third of the seepage was occurring.[58] Finally, late in the same month the Secretary announced final procedures on Outer Continental Shelf lease operations, information requirements, and new Department evaluation procedures for Outer Shelf leasing decisions.[59]

After the Secretary's review of federal Channel leases, the Corps of Engineers received requests for permits authorizing new Channel exploratory drilling (some in water 1,000 feet in depth, as opposed to 200 feet at Platform A) and, in the case of Sun Oil, a new Channel platform. In August the County of Santa Barbara objected to the permits and requested public hearings. (None had been held by any federal agency.) In September, however, the Corps issued several exploratory permits without such hearings. The County filed suit in the U.S. District Court, asking for a temporary injunction on issuance of further permits pending hearings. The Court held against the County and the Corps immediately issued the remaining permits. In November the Court of Appeals heard and refused the County's appeal and, late the same month, while Sun Oil was bringing its platform to the site, the U.S. Supreme Court denied certiorari and the stay requested.[60] Soon afterward the Sun Oil platform was placed just east of Union's Platform A -- the first new platform installed in the Channel since the spill.[61]

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[55] This eleven-man panel included many members from the President's fourteen-man panel on oil spills appointed the previous February. Both panels were chaired by Dr. John C. Calhoun, Jr., Vice President of Texas A&M, and staffed by the Office of Science and Technology.

[56] Panel report, Office of Science and Technology press release, June 2, 1969.

[57] Department of the Interior press release, August 2, 1969.

[58] Department of the Interior press release, August 15, 1969.

[59] 34 Fed. Reg. 13544, August 22, 1969.

[60] _County of Santa Barbara, et al. v. Robert J. Malley, et al_. _cert. denied_, November 25, 1969. Remanded to 9th Cir., No. 25049.

[61] The California State Lands Commission continued its ban on lease sales and drilling in state lands and no new state platform had been constructed.

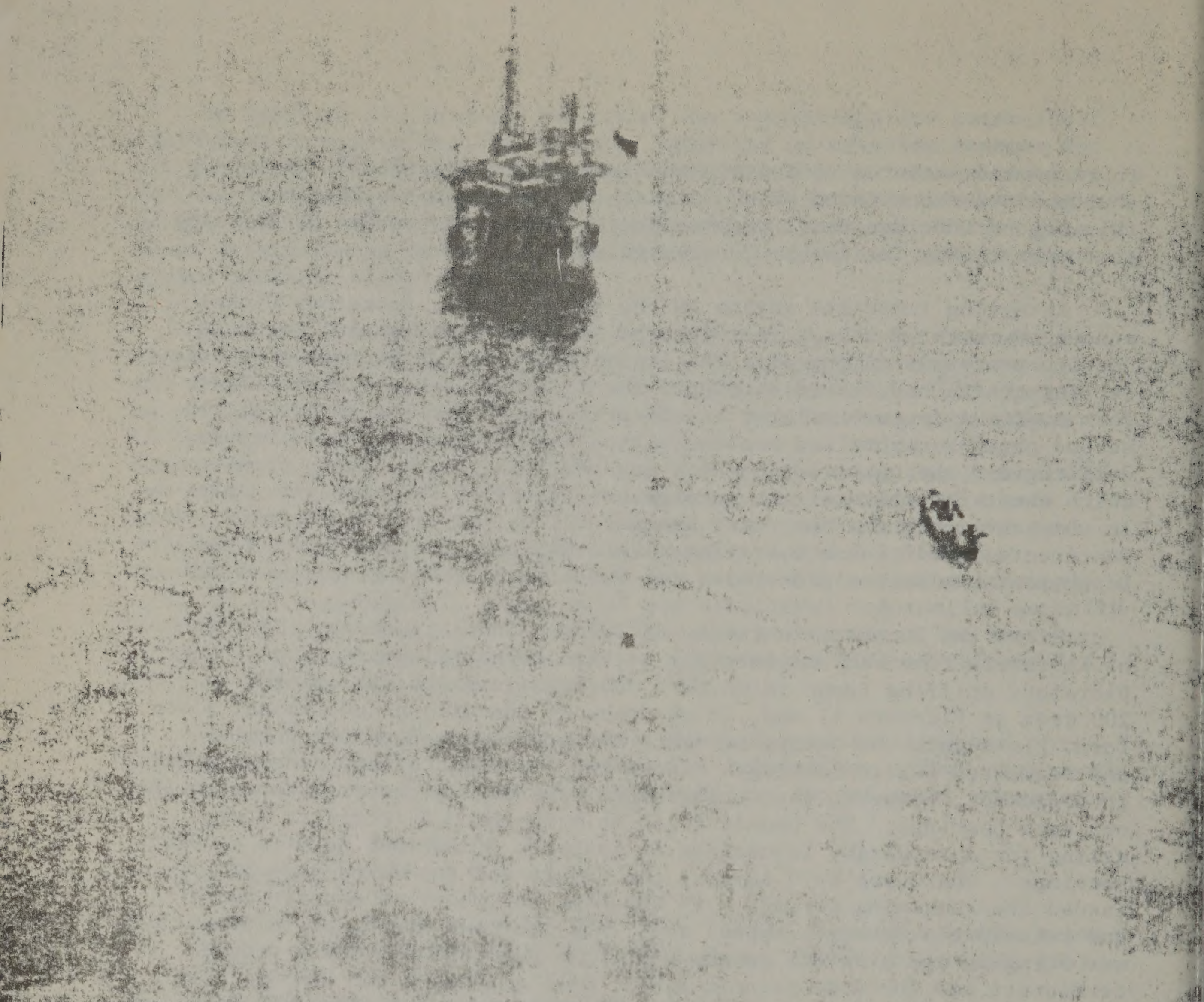

Fig. 2. Platform A on May 6, 1969, 99 days after the first spill.

Then in mid December, a new spill occurred in the Channel around Platform A; the 8½ inch pipeline leading from the production wells to shore sprung a leak. When these wells were shut down to allow repairs, oil pressure built up beneath the Channel floor and more oil was forced out into the ocean. After the pipe was repaired the wells were reopened and this seepage pressure was reduced. But by that time (December 23) some 22 miles of Santa Barbara and Ventura beaches had been newly polluted.

2. ENVIRONMENTAL IMPACT

Scientific reports to date indicate that the Santa Barbara spill did not result in serious short-term ecological damage to fish, mammals or other marine life. (Other environmental events at the time of the spill, notably heavy rainfall and storms, may have complicated the scientific analysis of short-term damage.) Bird fatalities were more serious, and survival rates of rescued birds were low. However, a major bird kill such as the one that occurred after the Torrey Canyon disaster did not result. Long-term ecological damage from the spill is at this time unclear, although there are some theories that it may be more severe. The most notable environmental effects of the spill were esthetic and recreational, and oil on the beaches was the simple cause. The long-term result of the federal decision to permit offshore platforms was also to make the view from the Channel shore less pleasing to the eye, seriously affecting the scenic qualities of the region, already disturbed by state platforms.

a. Effects on Marine Life

The Federal Water Pollution Control Administration commissioned two ecological studies of the effects of the Santa Barbara spill on marine life -- one dealing with the intertidal zone, the other dealing with the subtidal zone. These are, currently, the most complete studies of the spill's marine effects.

The intertidal study[62/] covered the period between February 28 and July 31, 1969. Associate Professor Michael Neushal (Department of Biological Sciences, University of California at Santa Barbara) was principal investigator.

Using baseline studies for comparison (primarily that by E. Y. Dawson in intertidal locations between Santa Barbara and San Diego in 1959), the team of observers ran a total of 25 low-tide transects at 10 locations between February 11 and March 3, and at several of these locations between April 25 and June 4. The teams observed changes in organisms affected by the oil and analyzed the results.

[62/] Neushal, Final Report Dealing with the Early Stages of the Santa Barbara Oil Spill, FWPCA Con. no. 14-12-516, Santa Barbara, California, 1969.

Although chemical cleanup did not cause significant study problems, the intertidal analysis was complicated by unusually severe storms and record-breaking rainfall in January and February of 1969.[63/] The report did conclude, however, that some damage did accrue to marine life that was due to the oil spill from around Platform A.

Blades of marine grasses that were exposed to oil had a tendency to hold it. They eventually turned brown and gradually disintegrated. In some locations up to 100 percent of the exposed blades were killed, while the same plants in extreme low intertidal and subtidal areas were largely undisturbed. (The report cited similar results found by the California Department of Fish and Game at Anacapa Island.)

Green algae in the higher intertidal regions was in most cases only slightly damaged by oil. Brown algae, in the lower and subtidal region was also only slightly damaged. Red algae which had a much greater tendency to retain oil, likewise, had a generally low mortality rate.

Barnacles, however, were in some areas severely damaged. At the most heavily oiled location, 90 percent of these animals were killed, and where oil was thick, death nearly always resulted. Oil seemed to stay on the barnacles and mortality extended into mid-intertidal areas.

The Neushal report summarized that "Although highly significant damage occurred to Phyllospadix torreyi (a common surf grass) and Chthamalus fissus (barnacle) populations in polluted areas, widespread damage to other intertidal organisms during the early stages of oil pollution was not immediately obvious."[64/] The report also noted that ". . . overall damage was definitely related to initial dose, especially

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[63/] According to Drs. Dale Straughan and Bernard Abbott, who are engaged in a year-long study of the spill's ecological effects for the Allan Hancock Foundation (financed by the Western Oil and Gas Association), these storms brought up to 30 inches of rain, causing immense damage and fresh water runoff into the Channel, influencing the distribution of oil spilled, marine organisms, and possibly, by augmenting the deep water table, influencing the natural oil leakages. Straughan and Abbott, The Santa Barbara Oil Spill: Ecological Changes and Natural Oil Leaks, University of Southern California, Allan Hancock Foundation, Los Angeles, California, 1969.

[64/] Neushal, supra note 62, at 39. The observations of John B. Glude, Deputy Regional Director, Pacific Northwest Region, Bureau of Commercial Fisheries, Seattle, Washington, add mussels to this otherwise small list. ". . . the only mortality which I observed to intertidal species was of mussels, mytilus californianus, ranging from perhaps one percent on the rocky beach southeast of Santa Barbara to 10 to 20 percent at the entrance to Channel Islands Harbor." Glude, Observations on the Effects of the Santa Barbara Oil Spill on Intertidal Species. April 10, 1969, at 6.

in the case of surf grass and barnacles."[65] The report concluded that long-term effects of the spill, or from continued man-caused pollution, at a rate higher than from the natural spills, remains unknown.[66]

In February, 1969, the FWPCA commissioned a scientific study by the University of California at Santa Barbara of the spill's effect on subtidal fish communities.[67] The study period lasted until August, 1969, and the work was done under Professor Alfred E. Ebeling, Principal Investigator.

The study compared collections of deep and shallow macroplankton in Channel waters polluted after the spill and in the Santa Cruz Basin farther off shore with other collections from previous years of no pollution. Since no noticeable fish kills followed the spill, the scientists examined less obvious criteria of near-shore ecosystem damage: decreased species diversity, numerical equitability and abundance, increased patchiness of species distributions, changes in community composition favoring the more tolerant species, and correlations with amounts of oil and tar estimated on the station.

The study concluded that most of the observed changes were due to climatic factors. Having determined what the various fish communities were, according to similar indices of many kinds, the study concluded that there were only minor differences -- due to other factors -- between polluted and unpolluted environments. It appeared that there were more fish in the heavily oiled regions, but that this was because kelp acted to accumulate oil, and fish were simply there because of the kelp. The scientists could not conclude that in this case the presence of crude oil was harmful. Of all the measurements made, the most disparate comparison involved the small (mysid) shrimp. Normally abundant on the canopy of the kelp, these shrimp are eaten by fish. After the spill the shrimp were not measurable on the kelp, but by August, when the kelp was not accumulating as much oil, the shrimp had become normally abundant again.

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[65] Neushal, supra note 62, at 39. Some cleanup damage did result. Hot water cleaning on the beaches removed an extensive community of limpets, snails, crabs and algae, along with the oil. Id.

[66] According to Max Blumer of Woods Hole Oceanographic Institute, long-term dangers from oil pollution may result from the fact that hydrocarbons in petroleum are highly stable in marine organisms -- passing through the food chain without alteration. "In the marine food chain hydrocarbons may not only be retained but they can actually be concentrated. This is a situation akin to that of the chlorinated pesticides which are as refractory as the hydrocarbons. These pesticides are concentrated in the marine food chain to the point where toxic levels may be reached." Hearings on S.7 and S.544, supra note 8, at 1488.

[67] Ebeling, Werner, DeWitt, Cailliet, Santa Barbara Oil Spill: Macroplankton, Fishes, FWPCA Con. No. 14-12-534, Santa Barbara, California, 1969.

Unlike the Torrey Canyon disaster, at Santa Barbara there was little use of chemical dispersants. According to Dr. Ebeling this was fortunate, since all oil dispersants are toxic to fish; the more effective the dispersant is on oil, the more toxic it is to fish.[68]

b. Effects on Marine Mammals

The Santa Barbara Channel is used by about 8,000 gray whales in their annual migrations, south in January and February, and back north in March. Large populations of elephant seals and sea lions are evident, particularly around San Miguel Island where a small population of northern fur seals breeds.

According to Fish and Wildlife Service reports,[69] there was little, if any, immediate adverse effect of the oil spill on these animals, and no concrete evidence of such effects has yet been revealed. Examinations of California sea lion and elephant seal populations on San Miguel Island in the spring of 1969 indicated that, although the beaches were polluted with oil in March, no traces of petroleum residue were found in blood samples or in the fetuses of sea lions, which were reported to have been aborted from normal attrition.[70] However, the long-term effects of extensive oil pollution on San Miguel's few miles of sandy beach, where the sea lions and elephant seals congregated at breeding time, have not been determined.

68/ Interview with Dr. Alfred W. Ebeling, Santa Barbara, California, December 12, 1969. An analysis of Corexit 7664, the dispersant primarily used after the spill, made by Dr. Reuben Lasker, Bureau of Commercial Fisheries of the Oceanography Center, La Jolla, California. Using fish larvae, which he considers "excellent bioassay organisms" (Letter to the author, December 22, 1969) he measured the toxicity of Corexit by time, up to its 50 percent mortality. He concluded that "concentrations of only 2 ppm. Corexit 7664 reduced the 50 percent mortality time of eggs and larvae to 57 percent of the control, while higher concentrations were slightly more detrimental." Commercial Fisheries Review, Vol. 31, No. 3, March 1969, at 7.

69/ Glude, supra note 64, and Hearings on S.7 and S.544, supra note 8, at 848.

70/ Department of the Interior Press release, June 29, 1969.

c. Effects on Bird Life

The Bureau of Sport Fisheries and Wildlife reports that 2,429 dead birds were counted, a minimal figure that does not include birds that starved elsewhere or drowned at sea.[71] The Bureau reported that the fact

> that bird losses have been low is purely fortuitous; the ingredients for a major avian disaster were present. . . . It was the consensus that bird populations in the area were generally low, due in part to the storm immediately preceding the spill. Many birds were driven out of danger, including an estimated 25,000 pintails reported in the area prior to the storm. Flooded inland areas may have provided a haven for some of the shore birds in search of food. Seasonal migrations of various species such as the brant and sooty shearwater had not begun. . . . It is frightening to think what might have happened had the usual flight of brant landed here during the critical period. Almost the entire population of this specie could have been exposed to extermination.[72]

Three bird rehabilitation centers were established after the spill, in cooperation with the State Fish and Game Department and Union Oil Company. Of the 1,536 birds brought to these centers, about 12 percent survived.[73] (A study of the work at one center notes that this survival figure might have been somewhat higher had it not been for the trial and error methods employed because of inexperience.[74]) The Bureau report is most useful in indicating the variation in survival rates by species.

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[71] Special Report, Santa Barbara Channel Oil Pollution Incident, January 28 through April 1, 1969. Division of Fishery Services, Portland, Oregon, May 9, 1969.

[72] Hearings on S. 7 and S.544, *supra* note 8, at 848.

[73] Special Report, *supra* note 71.

[74] Drinkwater, Heywood, Leonard, and Black, Santa Barbara's Oiled Birds, Santa Barbara, California, 1969.

Oil pollution and the resulting handling was much harder on some species than on others. For example, the survival rate for grebes was less than 6 percent, while for gulls it was over 70 percent. 75/

d. Aesthetic Effects

A visitor to Santa Barbara can easily understand why local opposition to federal Channel leasing was based primarily on aesthetics; the Santa Barbara coastline is one of the most beautiful areas in the country. Oil pollution from around Platform A and the very existence of federal platforms has detracted significantly from the area's attractiveness.

The Channel's 80 miles of east-west shoreline are protected to the south by the mountainous islands of Anacapa, Santa Cruz, Santa Rosa and San Miguel. The communities of Montecito, Carpenteria, Santa Barbara and Goleta border this shoreline and account for most of Santa Barbara County's 150,000 people. Just north of these communities, the Santa Ynez Mountains form an east-west backdrop, rising to more than 4,000 feet. The area has been described by the County's planning director as:

> a narrow plain hugging the shore, merging into rolling hills and rising to a mountain backdrop. The beaches are, for the most part, ideal for recreation and the water and climate is warm enough for year-round swimming. The ocean dominates the scene and building sites are oriented to the ocean with views of the shoreline and the Channel Islands 25 miles offshore. This unique setting, protected for 40 years by zoning, prohibitions against smoke and fumes, architectural controls and opposition to eyesores and ugliness, has given the Santa Barbara area its world-wide reputation for beauty and pleasant living. 76/

75/ The reason why rehabilitation efforts were not more successful is due to the complex reactions of a bird when it becomes covered with oil. When badly oiled, a bird's feathers become matted, and, if the bird does not drown from lack of buoyancy, it will often die of cold, since water replaces air in the plumage. In trying to get clean the bird will swallow oil, become ill and suffer stress. If in this weakened state the bird is rescued, the prime need is to counter the effects of cold, sickness, starvation and shock, and not simply to remove the oil. The oil removal itself is difficult since, if it is done with detergent, a bird's natural insulation and waterproofing is also removed. Proper rehabilitation is therefore a long and gradual process. See Boyle, Oil Pollution of the Sea: Is the End in Sight? Biological Conservation, Vol. I, No. 4, July, 1969, at 325.

76/ Statement by Richard Whitehead to Assistant Secretary of Interior Cordell Moore, February 28, 1967.

While revenue receipts to Santa Barbara County are diverse 77/, its tourist revenues are of sizeable importance. By 1968 tourist revenues to the County were about $53,000,000. Presumably this revenue reflects some of the environmental amenities of the region. In 1969, however, in the eight months after the spill, tourist revenues for the City of Santa Barbara alone were down $1,000,000 from the comparable period in 1968. 78/ Whether tourists were scared away from Santa Barbara because of adverse publicity or by actual oil conditions is conjectural. As long as oil is evident on the beaches (and reported) some effects on tourism are likely. (Oil at the high tide mark was plainly visible to the author as late as December 10, 1969, while visiting beaches immediately north of Platform A, just after a storm. 79/) With this problem in mind, the Santa Barbara Chamber of Commerce, representing the tourist industry, has publicly favored the prohibition of further federal leasing in the Channel. 80/

Any evaluation of the aesthetic impact of the federal offshore platforms on the Santa Barbara environment is inevitably subjective. (An assessment complicated by the fact that state platforms are also present and were there before federal leasing began.) Nevertheless, the matter must be discussed not only because the aesthetic effects of platform construction were recognized as a legitimate federal concern before leasing was permitted, but also because in Santa Barbara aesthetics have played a primary role in local feeling about offshore oil operations.

The author first viewed the Channel from the shoreline just east of Santa Barbara. The first impression was of delight at the extensive panorama

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77/ A Santa Barbara County report estimated that income to the entire county in 1965 amounted to $41,000,000 from tourism; $78,000,000 from agriculture; $64,000,000 from manufacturing; $98,000,000 from oil and gas (of which 2 percent was from offshore production); $28,000,000 from other mineral operations; and $412,000,000 from commercial fishing. Hearings on S.7 and S.544, supra note 8, at 654.

78/ Interview with Stanley Lowry, General Manager of the Chamber of Commerce of Santa Barbara County, December 11, 1969. This estimate was based on projections from the city 5 percent hotel and motel room tax, and the assumptions that room sales are about 22 percent of tourist expenditures and that there would normally be a 3 to 5 percent increase in tax receipts each year.

79/ Richard Smith, writing for the Santa Barbara News Press, reported that after a severe storm on December 7, 1969, ". . . large areas of oil, some as thick as 6 inches, show all along the /Rincon/ beach just below the entrance to the state park." Santa Barbara News Press, December 8, at A-1. Just north of Platform A, near the area seen by the author, it was reported that the beach ". . . was reminiscent of some of the early days of the ten month old Channel pollution crisis." Id.

80/ Hearings on S.7 and S.544, supra note 8, at 655.

of mountains along the near shore to the east and across the Channel on the Island of Santa Cruz to the south. But, immediately thereafter, attention focused on the offshore platforms. Although the day was somewhat misty, nine offshore structures were plainly visible, including the Sun Oil Platform in construction. Union Oil's Platforms A and B were directly to the south, and the six state platforms lay to the east. All these platforms were strikingly incongruous when viewed against the mountain background. (The Union Oil platforms appeared much nearer than their actual 5½ miles.) While the generally compact platforms were not displeasing individually, they were entirely out of character with the natural scene.

The visual detraction of the platforms was felt most strongly by contrast with the view toward the west; there no platforms were visible and the natural scene was unimpaired. Attention was drawn by the mountains and the long, spectacular sweep of the Channel. This, of course, was the value that many Santa Barbara residents had sought to protect with the state sanctuary. Both the platforms and the occasional oil pollution to the extent that it is man-caused, are recurring reminders of their loss.

3. PROBLEM ORIGINS

There were strong pressures from the Bureau of the Budget and the oil industry for early federal leasing of offshore Channel oil fields. The Bureau of Land Management (in charge of leasing) and the U.S. Geological Survey (incharge of lease operations) also favored early leasing. No public hearing was held after a general leasing sale was announced, although opportunity for one was provided by the Corps of Engineers. Such a hearing could only have covered the effects of offshore platforms, not whether, where or when to lease. Public opposition to federal leasing was hampered throughout the pre-leasing period by lack of information, assurances of those with information that pollution would be controlled, and the inherent difficulty of making a case based primarily on aesthetic arguments.

a. The Bureau of the Budget

Revenues to the U.S. government from the 1,300 oil and gas leases on the Outer Continental Shelf since 1953 have totalled approximately 4.4 billion dollars. 81/ In 1968 leasing sales and royalties from the nearly 4,000 oil and gas wells then producing yielded over one billion dollars to the federal treasury, one of the beneficiaries of which is the Land and Water Conservation Fund. 82/ Not surprisingly, therefore, the Budget

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81/ Hearings on S.7 and S.544, supra note 8, at 660.

82/ Under the Land and Water Conservation Fund Act of 1968, OCS mineral revenues are available "in an amount sufficient to bring the income of the fund to a total of $200,000,000 for the fiscal years 1969, 1970, and 1971, and to a total of $300,000,000 for each of the remaining two years of fiscal 1972 and 1973." Senate Report, Interior and Insular Affairs Committee, No. 1071, March 21, 1968.

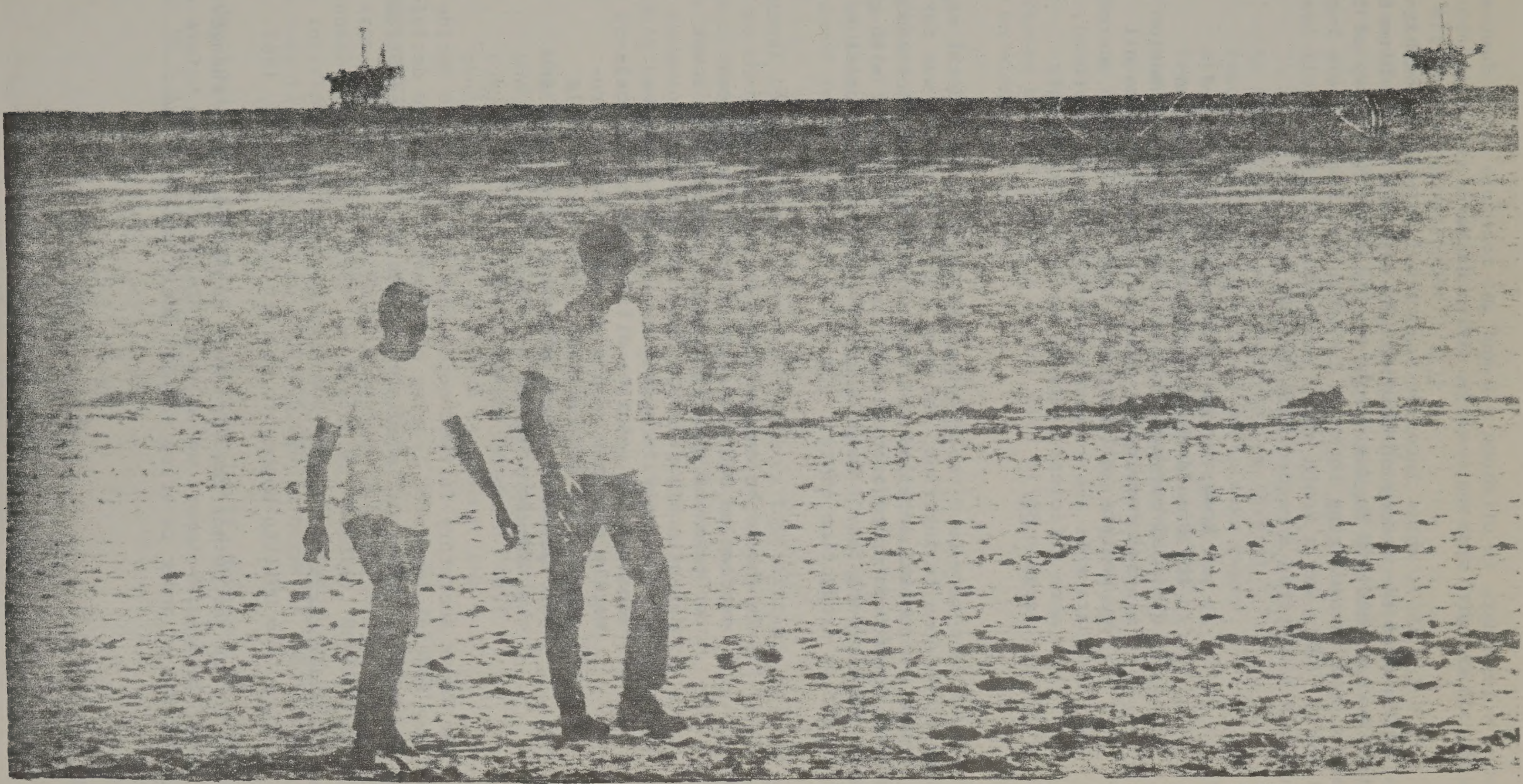

Fig. 3. Platforms A and B from Santa Barbara's East Beach, Dec. 26, 1969.

Bureau's interests in offshore oil and gas receipts was a dominant influence on the decision to lease in Santa Barbara.

In July, 1967, while Interior negotiated with Santa Barbara representatives over the extent of Channel leasing, the Deputy Director of the Budget Bureau, Phillip Hughes, wrote to the Under Secretary of Interior, Charles Luce, encouraging Interior to establish its offshore regulatory policies. (This was a month after a BLM sale of outer shelf leases off Louisiana had netted a record $510,000,000.):

> As you know, we are particularly interested in the Presidential decision to generate additional revenues from the leasing of the Nation's mineral resources. Recent indications from oil economists, oil companies and in oil trade journals are that the economic benefits through improved, more efficient practice would be exceedingly large. 83/

Under Secretary Luce replied that of the various federal regulatory alternatives open to Interior, the most lucrative course was for the federal government to publish detailed oil regulations for Interior administration, "to achieve maximum protection at minimum cost consistent with good (oil) conservation principles." Luce linked this revenue potential to appropriate oil import or production quotas.

> It should be emphasized that increased production on OCS would proportionately increase our revenues only if it did not result in lower domestic oil prices. Thus, to realize proportionately increased revenues it would be necessary to restrict oil imports in approximately the same amount as the increased production; or alternatively, the States would have to reduce their allowable production in that amount. 84/

The Under Secretary further noted that "if we should decide not to offer any federal lands for leasing off Santa Barbara the decision would be very expensive in terms of immediate revenue to the United States." By

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83/ Letter from Phillip Hughes to Charles Luce, July 11, 1967.

84/ As far as the author has been able to determine, no changes were made in federal import policies or state production before or after leasing in order to bring in this additional revenue.

offering a federal buffer zone along the state sanctuary "the cost would be less but still quite substantial." 85/

Several months later, Bureau of the Budget again prodded Interior; Director Charles Schultz reminded Secretary Udall of President Johnson's interest.

> As you know, the President has on several recent occasions instructed me to make every attempt to produce additional revenues from federal resources. Last fall after a successful sale off the Gulf Coast, he specifically asked me what might be done to increase revenues from offshore leasing. 86/

Schultz expressed special interest in the kind of regulations Interior would adopt on offshore leasing.

b. The Oil Companies

As early as 1958 it had been estimated that there were some four billion barrels of oil beneath the 1,800 square mile Santa Barbara Channel. 87/ This estimate, still current, can be compared with the 4.7 billion barrels consumed annually by the U.S. 88/

Throughout 1967 oil companies interested in this offshore oil, as represented by the Western Oil and Gas Association, were opposed to any leasing delays. They agreed finally to a two-mile buffer zone but objected to proposals for a more extensive area by Santa Barbara County. The Association summed up its position on Channel leasing in a letter to Secretary Udall in December, 1967, relying heavily on the argument that delay would create serious financial losses for oil companies:

> While the oil industry believes the danger to the /state/ sanctuary is exaggerated, the establishment of the proposed two-mile 'buffer zone' is more than adequate to protect the

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85/ Letter from Charles Luce to Phillip Hughes, July 14, 1967.
A memorandum of April 10, 1967, by Eugene W. Standley, Staff Engineer for the Interior Department, placed the cost of a sanctuary buffer zone at roughly $40,000,000 to $100,000,000 in terms of lost bonus revenue.

86/ Memorandum from Charles Schultz to Stewart Udall, November 20, 1967.

87/ *Hearings on S.1219*, *supra* note 9, at 99.

88/ *Id*.

> Santa Barbara Sanctuary. Any further compromise would seriously neglect the need to (1) prevent drainage of oil from federal waterbottoms, (2) provide the federal government with an important new source of income in the form of bonus and royalties from the leased lands, and (3) develop the known geologic structures so as to increase the petroleum reserves of federal lands. . . . In good faith, the petroleum industry has spent over $100,000,000 gathering geological and geophysical information in order to be prepared to bid intelligently at the proposed sale. This expenditure included numerous 'twin' coreholes under a program authorized and encouraged by the Department of the Interior. A considerable amount of drilling equipment and personnel has been assembled on the West Coast in anticipation of this sale and is now idle because of the unexpected delay. 89/

c. The Role of BLM and USGS

Oil and other mineral development of the U.S. continental shelf is governed by the Outer Continental Shelf Lands Act. 90/ The Act declares U.S. jurisdiction over submerged lands on the continental shelf that are seaward of lands confirmed to the states by the Submerged Lands Act. 91/ Thus the outer shelf excludes state lands extending generally to three miles on the Atlantic and Pacific coasts and to nine miles on the Gulf coast. Outer shelf limits extend, by terms of the 1958 Continental Shelf Convention (ratified by the U.S. on March 24, 1961), to the 200 meter mark or "to where the depth of super-adjoining waters" permits natural resource exploitation. 92/

(1) Leasing and Regulatory Authority

The OCS Act says that in order to prevent waste and conserve natural resources in the Outer Continental Shelf, the Secretary of Interior may

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89/ Letter from P. F. Sollars, Chairman, Exploration Committee, Western Oil and Gas Association, December 2, 1967.

90/ 67 Stat. 462 (1953) 43 U.S.C. §1331, et. seq.

91/ 67 Stat. 29 (1953) 43 U.S.C. §1301, et. seq.

92/ Geneva Convention on the Continental Shelf, April 29, 1958-June 10, 1964, 15 U.S.T. 471 (T.I.A.S. 5578).

make the necessary rules and regulations. 93/ His authority to grant oil and gas leases is explicit. 94/ The Act requires no public hearing before making such rules or regulations. 95/

The Secretary is given the authority to cancel leases, subject to the right of judicial review, only if they are non-producing. Producing leases may be cancelled only after an "appropriate proceeding" in the U.S. District Court, only when the owner fails to comply with the statute, the lease or the regulations "in force and effect on the date of the issuance of the lease. . . ." 96/

The Secretary divided his authority between the Bureau of Land Management and the U.S. Geological Survey. BLM was to administer the leasing and USGS was to supervise and regulate actual operations on outer shelf lands. 97/

(2) Oil and Gas Leasing Procedure for the Outer Continental Shelf

Leasing procedures followed by the BLM and USGS before the Santa Barbara spill did not provide for public hearings or any evaluation by the Interior Department of non-mineral uses of marine resources. BLM was required to publish in the Federal Register such procedural steps as the notice of map availability (whereby the public might see what areas were proposed for leasing), the call for oil companies to nominate the areas on which they wished to bid, and the notice of lease sale. 98/ Most of the material published and the terms used in the Register are highly technical.

93/ 43 U.S.C. § 133.

94/ 43 U.S.C. §1337.

95/ The administrative Procedure Act states the general requirement that rules be published in the Federal Register 30 days before their effective date, 5 U.S.C. 553(d), and that "each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule." 5 U.S.C. §553(e).

96/ 43 U.S.C. §1334(b).

97/ 43 C.F.R. §3380, et. seq. (BLM) and 30 C.F.R. §250, et. seq. (USGS).

98/ The principal steps in the oil and gas leasing procedures that were followed before the spill are summarized as follows:

(a) The first (exploratory) phase began when oil companies obtained a letter from the USGS permitting them to gather data on oil and gas deposits by seismic surveys and drill core sampling. (Continued)

Apparently the Interior Department sought more than the usual amount of geological and geophysical information on Channel lands before deciding to lease. Secretary Udall announced soon afterward that:

> This particular portion of the continental shelf has been under intensive geologic investigation

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98/ (Continued)

(b) The companies next indicated their interest in particular areas of shelf lands by requesting that the Secretary offer them for public lease.

(c) USGS and the Bureau of Land Management analyzed these requests and jointly might recommend a lease sale. If the Secretary agreed, BLM prepared leasing maps of areas to be leased and excluded from nomination. Notice of map availability would be published in the Federal Register.

(d) BLM issued a call for nomination of units that companies might wish to have offered for lease sale. Publication in Federal Register. (For the Santa Barbara lease, 31 Fed. Reg. 16629, December 29, 1966.)

(e) Oil and gas companies nominated areas by notifying USGS Regional Supervisor.

(f) BLM published notice of lease sale in Federal Register. (For Santa Barbara, 32 Fed. Reg. 20884,December 28, 1967.)

(g) At sale (for Santa Barbara, February 6, 1968) oil companies made sealed bids for tracts offered, each one required by statute to be no larger than 5,760 acres. The cash bonus offered by the oil companies, reflected the company's belief in the chances of oil and gas discovery. A royalty of not less than 12½ percent of the production value must be established by the Secretary. (16 2/3 percent for Santa Barbara.)

(h) BLM, as executor of the lease, awarded it to the "highest responsible qualified bidder," the lease being for five years and as long thereafter as oil or gas is produced.

(i) A drill plan of the oil company would be forwarded to the USGS Regional Oil and Gas Supervisor for approval along with various information from the exploratory drilling operations. After discovery, a development plan was to be submitted, and approved by USGS.

> for several years. Undoubtedly more was known about it and in greater detail than any other area of comparable size along our entire coastline. 99/

However, after the spill, the Director of USGS reported that "without any question of doubt we did not have as much information on the detailed reservoir conditions as existed in the oil company files." 100/

(3) The Role of USGS After the Santa Barbara Lease

The Regional Supervisor has broad discretion over the operations of the lessee, and his approval is required before each operational stage. 101/ Granting the casing variance on the wells of Platform A was one exercise of such discretion.

In early 1965 the USGS Regional Supervisor of the Pacific and Gulf coast regions issued an OCS Order for offshore oil, gas and sulphur operations. 102/ The Order elaborated on the general prohibitions against pollution in USGS regulations, 103/ and was directed primarily at spills and disposal of oil and other hazardous material from the platform.

At the time of the Santa Barbara disaster the Regional Supervisor for the Pacific Region had four petroleum engineers available to carry out the necessary on-scene supervision and inspection, only two of whom were based at Santa Barbara. (Nevertheless, the Regional Supervisor testified that more inspections would not have avoided the spill, since Union Oil had complied with all USGS requirements. 104/)

99/ Department of the Interior press release, February 7, 1968.

100/ *Hearings on S.1219*, *supra* note 9, at 69.

101/ 30 C.F.R. §250.34. See also §250.10, *et. seq*.

102/ OCS Order No. 7, March 31, 1965.

103/ 30 C.F.R. §250.42.

104/ *Hearings on S.7 and S.544*, *supra* note 8, at 673.

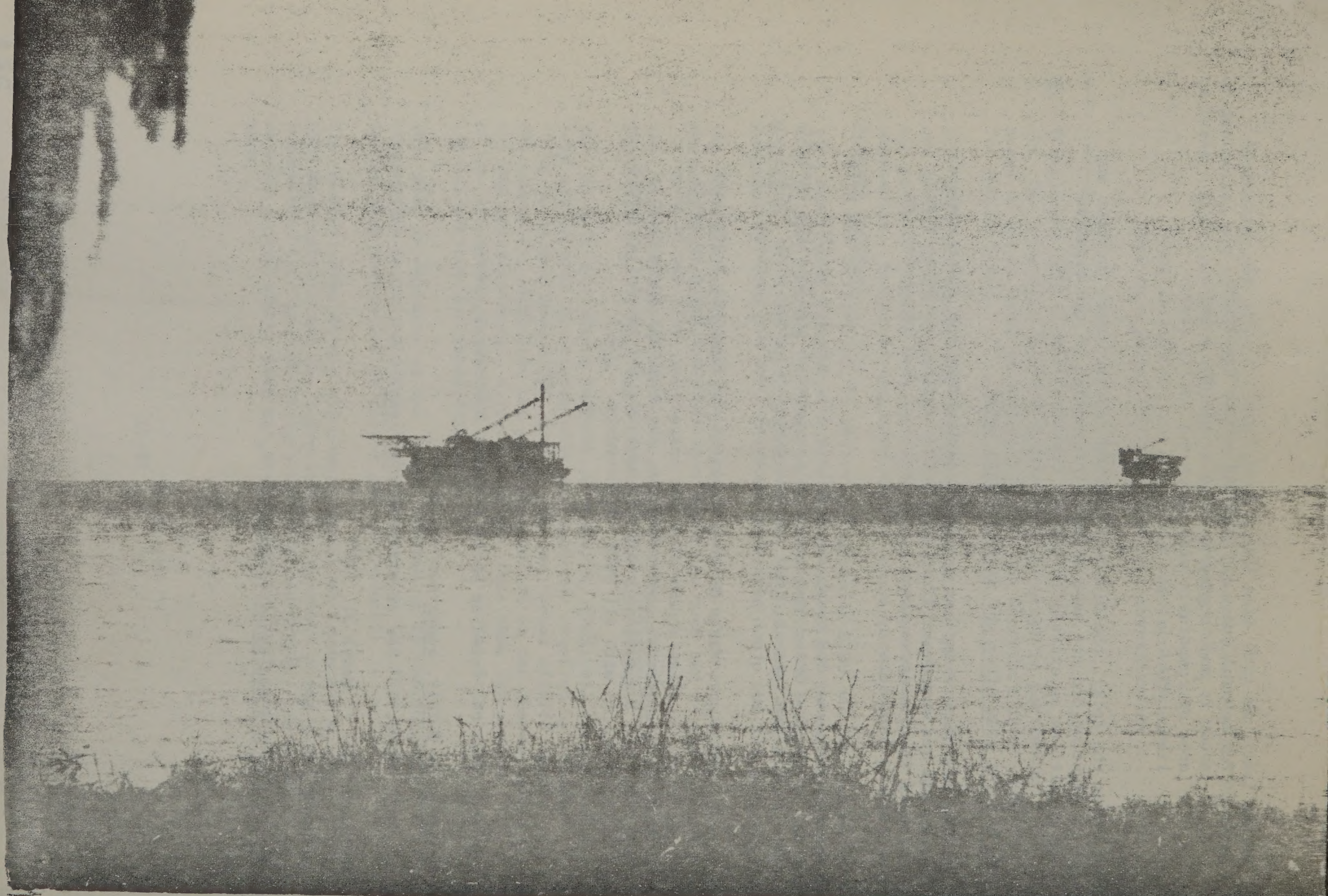

Fig. 4. Ocean view from Summerland, five miles east of Santa Barbara. Platform Hilda (left) and Platform A

d. Corps of Engineers

The authority of the Secretary of the Army over offshore oil rigs was specified in the Outer Continental Shelf Lands Act. Section 4(f) of the Act states:

> The authority of the Secretary of the Army to prevent obstruction to navigation in the navigable waters of the United States is extended to artificial islands and fixed structures located on the Outer Continental Shelf. 105/

The Army's navigational authority mentioned above is based on Sections 9 and 10 of the 1899 Rivers and Harbors Act. 106/

Regulations for the granting of Corps of Engineers construction permits under the 1899 Act were once based primarily on navigational effects of a proposed project, but in December, 1967, the grounds for denying a permit on U.S. navigable waters were broadened to include the activity's effects on pollution, fish and wildlife and recreation as well. 107/

One other statute affecting Corps authority should be noted. Broad pollution control authority is granted to the Corps under Section 13 of the 1899 Rivers and Harbors Act. The Section declares it unlawful to deposit material on navigable waters or their banks so as to impede navigation unless permitted by the Secretary of the Army. 108/

The Corps authorizes offshore oil operations in its Los Angeles District (of which the Santa Barbara Channel is a part) in three stages,

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105/ 43 U.S.C. §1333(f).

106/ 33 U.S.C. §401 and §403.

107/ 33 C.F.R. §209.330(a).

108/ 33 U.S.C. §407. Violation of this section is a misdemeanor under 33 U.S.C. §411.

none of which requires a public hearing. 109/

In November, 1967, however, the Corps (which had authorized four outer continental shelf oil platforms in the Los Angeles District plus a fifth platform not yet built) decided to hold local public hearings on the proposed drainage lease platform of Phillips Petroleum. There was at that time evident public interest in the potential effects of the proposed platform on coastal communities.

While the District Engineer declared at the hearing that only the platform, not the offshore lease itself, was to be considered, this distinction was not always maintained by witnesses--indicating the inherent ambiguity of the Corps offshore permit role. Ultimate permit approval was hardly in doubt.

The reasons were, first, that the Corps permit authority granted by Section 4(f) of the Outer Continental Shelf Lands Act relates to obstructions to navigation from activities not within territorial waters, and Corps authority under the 1899 Rivers and Harbors Act may be much broader. But disregarding this possible distinction at its Phillips Petroleum hearing in Santa Barbara, the District Engineer noted that he would hear testimony on "any matter pertinent to the structure which might bear on the public interest." 110/ Thus, the Corps heard statements on pollution, recreation, aesthetics, and fish and wildlife, as well as navigation aspects of the proposed Phillips platform.

109/ (1) It authorizes geophysical explorations for a six-month term by letter with no public notice or hearing.

(2) Drill core exploration outside the Santa Barbara Channel is authorized by letter for a similar term with no public notice, while those explorations within the Channel are advertised by public notice for 15 days and a three-year permit is issued for each tract. Public hearings are held at the Corps' discretion. Permit renewal is granted under the same procedures.

(3) Applications to construct permanent offshore platforms are publicly advertised for 30 days and a public hearing is held at the Corps' discretion. The permit requires construction within three years and may be revoked. Hearings on S.7 and S.544, supra note 8, at 539-40.

110/ Corps hearing, supra note 14, at 4.

Second, under Section 1(c) of its lease 111/ Phillips was given the right to construct an offshore platform. Platform approval had already been granted by the USGS, which requested rapid permit approval by the Corps at the hearing. 112/

Third, according to testimony by the drilling contractor at the hearing, from $1,750,000 to $2,000,000 had already been invested in the lease by oil company contractors. 113/ The platform itself was nearing completion in a Gulf Coast shipyard and was expected to be delivered through the Panama Canal by the following month.

After the hearing, in January, 1968, the Corps recommended certain pollution control guarantees against earthquakes and tsunamis, and provisions whereby the structure would be removed upon proof that it was causing "pollution of navigable waters to the extent that adjacent beaches or marine life in the area are detrimentally affected." 114/ A detailed letter from the Phillips Company to the Corps District Engineer at Los Angeles objected to these provisions as being contrary to its lease, unneccessary in view of the USGS pollution requirements, and not within the area of the Corps responsibility. It suggested a new provision to incorporate these concerns, to the effect that the permittee would abide by OCS regulations and would take "reasonable precautions" to control pollution. 115/ Thereupon, after discussions with Interior, the Corps adopted the substitute language suggested by Phillips. (The same provisions were inserted in the permit granted to Union Oil for Platform A.)

In its discussions with Interior after the Phillips hearing, the Corps sought to resolve the inherent ambiguity of its permit role and determine how non-navigational considerations should be coordinated with Interior. An Interior staff memorandum summarized the proceedings of one such meeting, which highlighted the differences between Interior and Corps approaches to the public.

> Discussion centered around 'public interest' aspects in our offshore operations. . . . I pointed out that we had handled our own public relations business in Santa Barbara through

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111/ November 20, 1967, at 4.
The Phillips lease and Union Oil lease are similar, see Hearings on S.7 and S.544, supra note 8, at 322.

112/ Corps hearing, supra note 14, at 19.

113/ Id., at 87.

114/ Letter of C. Rex Boyd, Division Chief Attorney, to Col. Norman E. Pherson, July 24, 1968.

115/ Id.

> city, county and state people and had chosen not to go the public hearing route. That we had tried to warn L. A. Distr. Engr. of Corps of what he faced and we preferred not to stir the natives up any more than possible. . . . All decided that more coordination and a better method of Corps permit handling could solve our problems. /The Corps representative will/ . . . see about combining our approvals for platform installations to give the companies a better service. 116/

When Union Oil requested Corps permit approval for Platform A, the Corps and Interior had not yet resolved their differences. No public hearing was held by the Corps. However, since the local governments did not at that point believe them useful, a jurisdictional conflict with Interior was avoided. 117/

e. Public Opposition

Opposition to federal leasing was primarily local, although national conservation organizations, notably the Sierra Club, also objected. That aesthetics were the primary concern of these opponents is partly due to their difficulty in obtaining information on potential pollution problems or other hazards that might result from the unique structure of the Channel floor.

At the meeting between federal, state and local officials in May, 1967, Santa Barbara officials were given strong assurances from federal and state representatives that offshore pollution disasters could be simply avoided.118/

116/ Memorandum for the files, Department of the Interior, from Eugene Standley, February 15, 1968.

117/ After the spill the Corps and Interior did reach an agreement regarding their respective roles in offshore exploration and platform construction. Under new Corps regulations, only navigational and national defense matters will be considered by the Corps in granting permits for activities conducted outside territorial waters. Corps of Engineers Reg. No. 1145-2-303, Change 4, 6.a., December 3, 1969.

118/ Mr. Allan R. Coates, Jr., Mayor, City of Carpenteria, "brought up the problem of pollution, and asked what provisions there are concerning this." J. Cordell Moore, Assistant Secretary, Mineral Resources, stated that "wells are plugged at the bottom, so there is no seepage." (Minutes, Offshore Oil Drilling Conference, Santa Barbara, California, May 12, 1967, at 5). George M. Clyde, Supervisor, County of Santa Barbara, "asked what the hazards of one of these platforms polluting large area beaches are." F.J. Hortig, State Lands Commission, "answered subminimal. If there is any leak, the well is shut down automatically." (Id. at 7.)

Similarly, citizens testifying at the local Corps hearing on the Phillips platform, in November, 1967, did discuss the potential hazards resulting from earthquakes, faults and other unique features of the Channel floor, 119/ but safety assurances were offered by platform contractors and oil and marine supply companies. 120/ No other public hearing on these matters was held.

Santa Barbara citizens faced several problems in getting information on the geological and technical aspects of offshore drilling. First, certain geological and geophysical information is protected by the USGS as proprietary and is not released to the public. 121/

Second, and perhaps less importantly for the citizens, the information received by the USGS was itself limited. USGS regulations did not require that seismic and geophysical information acquired by oil companies in exploratory operations be made available to the government.

Third, citizens faced difficulty in obtaining expert scientists free from industry ties and willing to assist in interpreting and investigating data related to offshore oil and gas exploration and production. 122/

Finally, information problems resulted from the fact that no federal agency clearly sought to represent any public environmental constituency with regard to offshore leasing.

As a result of all these deficiencies, opponents of immediate federal offshore leasing relied heavily on the basic complaint that the platforms were ugly and that not enough was known about the effects of drilling. In the face of the expertise of BLM and USGS, this latter argument was weakened, leaving primarily the aesthetic complaint.

119/ Corps hearing, supra note 14.

120/ Id., at 71, 78.

121/ 5 U.S.C. §552(b)(9). For discussion and evidence of USGS reluctance to release to the public the data it developed see, Hearings on S.7 and S.544, supra note 8, at 585 and 674-676.

122/ For some discussion of this problem in litigation after the spill, see Science, April 25, 1969, at 411, and commenting letter, Science, June 27, 1969, at 1466.

4. ENVIRONMENTAL CONSIDERATIONS

a. Considerations

(1) Fish and Wildlife

Before leasing in the Channel, neither BLM nor USGS made any biological or ecologicalstudies indicating the effect of offshore drilling on the Channel. Experience off the Gulf coast had not indicated that platforms were adverse to fish populations, and, at the Corps of Engineers hearing on the Phillips Petroleum platform request, spokesmen for Phillips cited a three-year fish study by the California Department of Fish and Game (under contract to the Western Oil and Gas Association). The study concluded that the existing state platforms were "generally beneficial to the flora and fauna . . ." 123/

(2) Aesthetics

The aesthetic effects of offshore oil operations received the most federal attention. In fact, the Fish and Wildlife Service, for example, was primarily concerned about these effects. Its involvement in Santa Barbara leasing began early in 1967, when Assistant Secretary for Fish and Wildlife, Stanley Cain, wrote Assistant Secretary for Mineral Resources, Cordell Moore: "According to what I have been told of these /offshore oil/ operations, we have every reason to believe that there will be no serious problems for the fishing industry when the leases are awarded." 124/ Subsequently, Assistant Secretary Cain became interested in the possibility of creating a marine park, or sanctuary, in the Santa Barbara Channel.

In August, 1967, Assistant Secretary Cain recommended that the Secretary establish the first national marine sanctuary in the Channel--a place where oil leasing would be prohibited. (Several marine sanctuary study bills had already been introduced in the 90th Congress, calling for a moratorium on oil and gas and other mineral or industrial development. 125/)

> The expected difficulty in establishing marine sanctuaries is that we often do not know what values may be foregone, such as mineral potential, but in most National Parks and Monuments the country has foregone these values in favor of preservation of habitat and landscape.

123/ *Corps hearing*, *supra* note 110, at 13.

124/ Letter from Stanley Cain to Cordell Moore. April 27, 1967.

125/ H.R. 11460 and H.R. 11868, 90th Cong.

> In the Santa Barbara case, the oil is not really speculative, so we have to face squarely the question of preservation.

He went on to say that the Secretary might

> . . . seek to establish a national reserve 126/ outside the sanctuary for whatever distance is feasible. I would favor this. I believe the time is ripe to take such actions. For one thing, they do not require land purchase. 127/

Several days later, however, after conversations with Assistant Secretary Moore, Cain's position changed. In writing again to Secretary Udall, Cain called attention to Moore's willingness to accept a two-mile buffer zone along the state sanctuary and to Moore's objection to Santa Barbara County's request for a one-year moratorium on leasing and drilling. According to Cain, Moore said that if the Secretary could

> accept the criticism such moratorium would draw from the oil companies and the budget people he (Moore) would go along. However, there is already enough known about the oil potentialities off the sanctuary and other related matters that a period of further study is scarcely needed.

Cain mentioned the deep water between the Channel Islands and the shore and his believe that

> the continental shelf that you might set aside as a sanctuary would not be able to prevent oil development in any case. On the basis of this information, and especially because of the very high value of the resources and the public revenues therefrom, this would be a poor place to attempt to initiate the first marine sanctuary. 128/

126/ Section 12(a) of the Outer Continental Shelf Lands Act authorizes the President to "withdraw from disposition any of the unleased lands of the Outer Continental Shelf." The Key Largo Coral Reef Preserve was created in 1960 by the President under this provision /Pres. Proc. No. 3339 (1960)/ and is now administered by the Secretary of Interior for conservation and recreation purposes. 43 C.F.R. §1.51 et. seq.

127/ Memorandum from Stanley Cain to Stewart Udall, August 7, 1967.

128/ Memorandum from Stanley Cain to Stewart Udall, August 11, 1967.

In September, 1967, the Assistant Secretary for Public Land Management, Harry R. Anderson, outlined to Santa Barbara County Interior's plan to protect the state sanctuary by means of a two-mile buffer zone. As far as Secretary Anderson was concerned this buffer was designed primarily to ensure that no drainage of state oil, and therefore no state drilling, would result in the sanctuary.

In his discussion with state officials, Secretary Anderson spoke in favor of a federal-state cooperative arrangement whereby state-sanctuary oil could be developed from platforms in adjacent federal waters. "(W)ith such an agreement in effect, it would be possible for the United States to lease up to the /three-mile-wide/ sanctuary and still protect the sanctuary from surface development." 129/

When in November, 1967, the County of Santa Barbara responded to Interior's buffer plan with a plan of its own--to extend the buffer zone, limit acreage to 10 percent of the proposed total and reduce the number of platforms, its arguments were dismissed by Assistant Secretary Moore.

> Further action of this sort would be beyond our original intention to prevent drainage of the state sanctuary. The two affected tracts cover the remainder of the Rincon trend and is the last of the prime acreage of our proposed sale. This would be 'deferring' additional bonus money above that that could be received if we leased the two-mile buffer zone and acreage. I cannot see how these people can expect us to absorb any additional revenue losses merely because of their further obsession to protect their view. 130/

The Department thereafter adopted Assistant Secretary Moore's position and held the general Channel lease sale two months later.

(3) Pollution

Primary jurisdiction over pollution prevention in federal offshore oil operations was vested with the USGS. With scant exception 131/ there

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129/ Memorandum for the Report, Eugene W. Standley, Department of the Interior, September 25, 1967.

130/ Letter from Cordell Moore to Under Secretary Charles Luce, December 1, 1967.

131/ When the Corps held public hearings on the Phillips lease in November, 1967, a representative of the FWPCA presented brief testimony. He cited the FWPCA requirements that adjacent water be free from pollution, and offered surveillance and enforcement assistance under Executive Order 11288 and other acts. Testimony of John C. Merell, Jr., Southern California Field Station, FWPCA. Corps hearing, supra note 110, at 39.

was little FWPCA participation in the Santa Barbara offshore leasing processes.

Thus, in February, 1968, when leasing took place, Secretary Udall who, with the Secretary of Transportation, had just issued a joint report to the President on oil pollution, sent a memorandum to the Director of the Geological Survey on this very subject.

> Because of the local concern for scenic values and objections to leasing . . . it is essential that the Geological Survey, whose responsibility it is, take every precaution possible in its supervisory functions. Pollution from oil spills in drilling and production is an additional hazard which we must take every possible means to avoid.

The letter noted that the new operations and techniques needed for deep-water production required USGS to

> keep abreast of these so that our regulatory work does not impede this new effort by the industry, and is at the same time effective in carrying out our responsibilities.
>
> . . . I urge the Geological Survey to make available adequate manpower and funds to carry out this task on which I place a high priority. The assistance of other bureaus and offices of the Department, particularly the Federal Water Pollution Control Administration, should be enlisted as necessary. 132/

The primary role of USGS and the apparent nonparticipation of the FWPCA in the leasing decisions and operations were investigated at Senate hearings. Former Secretary Udall agreed with Senator Muskie, Chairman of the Air and Water Pollution Subcommittee of the Senate Public Works Committee, that documents and minutes did not indicate an FWPCA role in the leasing discussions. Secretary Udall noted that "of course we have already brought out the fact that the oil spill was not the major policy issue that was developed here, and this is really where we failed. . . ." 133/ Udall pointed out that ". . . had anyone, including FWPCA, raised

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132/ Letter from Stewart Udall to William Pecora, February 17, 1968.

133/ *Hearings on S.7 and S.544*, *supra* note 8, at 1286.

the question of oil spills as one of the major considerations to be analyzed in making that final judgment . . . we would have had a different process. . . ." 134/

One reason for the nonparticipation was simply that USGS believed that drilling in the channel was not a significantly different problem from drilling on land, except for platform construction. The theory was that since platforms and pipelines were designed to withstand stress from the earthquakes 135/ which were frequent in this region, 136/ major oil spills would not result.

b. Alternatives

It is safe to say that had the spill been considered a serious possibility, federal Channel leasing would not have taken place; events have shown that the revenue receipts were not worth the high social and economic costs of the spill. Total damage claims against the U.S. by various litigants, including private class actions, are themselves more than two-billion dollars. 137/

134/ Id. at 1288.

135/ See Corps hearing, supra note 14, at 8, 10.

136/ "The Santa Barbara Channel region is seismically active: since 1900 it has experienced two earthquakes of magnitude 6, and in 1812 it was the site of a shock that may have attained magnitude 7. Several earthquakes greater than magnitude 7 are known to have occurred in nearby regions of California. Tsunamis have been generated in the Channel region; however, none was associated with the magnitude 6 earthquakes of 1925 and 1941, which were located under the Channel. Earthquakes of magnitude 6 and larger can be expected to occur in the future in the vicinity of the Channel, and it would be consistent with past behavior if several such events occurred in the next century." Hamilton, Yerkes, Brown, Burford and DeNoyer, "Seismicity and Associated Effects, Santa Barbara Region," Geology, Petroleum Development, and Seismicity of the Santa Barbara Channel Region, California, Geological Survey Professional Paper 679, 1969, at 66.

137/ The largest damage claims are: Pauley Petroleum, Inc., et al. v. United States, No. 197-69 (Ct. Cl., filed April 9, 1969), claiming that new regulations on absolute liability were confiscatory and a breach of contract ($231,000,000 in damages); State of California, et al. v. Union Oil, et al., No. 84594 (Super. Ct. County of Santa Barbara, California, filed February, 1969), for damages to property, and fish and wildlife based on strict liability, negligence, and statutory violations, ($560,006,000 in damage); State of California, County of Santa Barbara, and Cities of Santa Barbara and Carpenteria on Standard Form 95, filed with Department of the Interior, February 18, 1969, claiming damages based on deprivation of property as prohibited by the 5th Amendment ($500,000,000).

Before the federal leasing decision was made, several proposals had been presented to Secretary Udall urging other courses of action. These included recommendations by Santa Barbara County and the Sierra Club for a leasing moratorium, and the short-lived suggestion of Assistant Secretary Cain for a marine sanctuary and oil reserve in the Channel. 138/ Federal budgetary pressures for leasing were great, however, and if their economic investments are any indication of expectations, oil companies did not doubt during 1967 that federal Channel lands would ultimately be offered for sale.

Since the spill, the Department of the Interior has made several important changes and interpretations in administrative regulations that might have changed the leasing decision. New regulations now require that before a decision to lease in a new area, a total environmental evaluation must be made by the Director, Bureau of Land Management. Reports from other (unspecified) federal agencies must also be received before new leasing approval. 139/ The Director "may hold public hearings" once leasing is decided on and prior to the selection of leasing tracts, and he "may consult with state agencies, organizations and individuals to aid him in his evaluations and determinations." 140/

The Interior Department chose not to use the public hearing mechanism before selecting leasing tracts; private negotiations with local officials were employed instead. Had Interior sought meaningful public hearings, designed to ensure total environmental and social evaluation of leasing effects, it would have been necessary to help the public understand large amounts of highly technical information not previously available to the public (or necessarily available now 141/). If the hearings were to be more

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138/ Apparently not examined in 1967 was a proposal made after the spill that, even before the spill, would have brought in new federal revenue while meeting arguments of an impending oil shortage on the West Coast in the early 70's. Two bills introduced in June, 1969 (H.R. 12541 and S.2516, 91st Cong., 1st Sess. 1969), recommended that federal lease contracts in the Channel be terminated and Naval Petroleum Reserve #1 (Elk Hills, Kern County, California) be transferred to Interior as public domain and put into production by oil companies with Channel leases (who would receive a credit in competitive bids for Elk Hill leases).

139/ 43 C.F.R. §3381.1, *supra* note 69.

140/ 43 C.F.R. §3381.4. Neither the environmental evaluations nor the discretionary hearings are designed to apply to drainage tract leasing, despite the fact that a spill *could* have occurred from the Phillips platform. 43 C.F.R. §3381.6.

141/ Since the spill it is not clear to what extent Interior's public information policies have changed. In May, 1969, the Department proposed that geological and geophysical interpretations of a lessee oil company be made available to the Department, and to the public against the company's wishes if it was administratively determined to be "in the public interest." (34 Fed. Reg. 7381, May 7, 1969). In August final regulations provided that such information could be publicized against the oil company's wishes only when "such information is required and necessary for the proper development of the field or area." 30 C.F.R. §250.97.

than window dressing, public release of the Interior findings after the hearings would also have been necessary. Any decision to lease would at least have been based on public information and might have been better understood by the local public (which now seriously distrusts the Department). If Interior decided not to lease or to have more limited leasing, both the oil industry and the Bureau of the Budget might more easily have accepted the result. As it turned out, the Department did not care to confront these parties with such a decision.

Pre-leasing public hearings were recommended by the first DuBridge panel, which noted that "the holding of hearings is a costly and time-consuming process and if there were any other way of accomplishing the same goal, we would happily recommend it, but we feel that there is no satisfactory substitute for hearing a variety of views in a public forum." 142/

Had such hearings been held before Channel leasing, several Interior Department assumptions might have been questioned publicly. For example, throughout the pre-leasing negotiations with Santa Barbara officials, Interior agencies evidenced a strong faith that oil industry technology was capable of pollution-free offshore drilling. The agencies did not consider whether the new offshore technology should have been tried elsewhere first, before its use in the Channel. Likewise, no Interior agency, including the FWPCA, sufficiently examined the available cleanup technology, equipment and expertise to respond to a Channel spill. Had public hearings been held in Santa Barbara, these agency assumptions and neglects might have been brought to light.

These benefits of public hearings could not be obtained through the Corps' hearing procedures. However well intentioned, the Corps hearing on the Phillips platform was inherently unresponsive to the environmental concerns of the local public. Given the Interior decision to lease, the legal position of the oil companies and the limited statutory mandate of the Corps, the entire affair was bound to be a rubber stamp.

Before leasing, Secretary Udall had concluded that BLM and USGS were the appropriate agencies to coordinate and assess all relevant environmental data. It is questionable, however, whether the agencies responsible for (and from habit and inclination most interested in) offshore leasing are the most suitable parties to make these total environmental evaluations. It is doubtful that any agency directed to obtain economic benefit from a federal resource will take a strong environmental position where significant immediate revenue reductions would result.

After leasing, apparently realizing the need for a broader assessment of marine programs, Secretary Udall established the Office of Marine Resources, in October, 1968. The action was announced in order

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142/ Offshore Mineral Resources, A Challenge and an Opportunity. Second Report of the President's Panel on Oil Spills, October, 1969, at 7.

> to strengthen the advancement and coordination of Interior's significant marine resources programs, including those related to marine geology, determination of mineral potential, mineral development, oil and gas exploration and leasing, marine hydrology and pollution . . . marine biology, commercial uses of the living resources of the sea, sport fisheries and recreation. 143/

Under the supervision of the Assistant Secretary for Fish and Wildlife, Parks and Marine Resources, the Office of Marine Resources was directed to analyze, coordinate, review, report on and recommend policies on marine resources programs of Interior, "serving as the focal point for the Department's broad multi-bureau relationship in the field of marine resources . . . with other government agencies . . . private industries . . . and the public. . . ." 144/

If such a focal point had been employed before leasing, the possibility of a marine sanctuary or federal oil reserve (holding the resource until the development and testing of such new technology as underwater completions), might have been more fully considered. Similarly, the agency might have evaluated the relationship of offshore oil leasing to federal oil import policies, noted by Under Secretary Luce, 145/ and might have helped ensure that oil import policy reflected the environmental costs of domestic oil production from offshore reserves. Finally, such an agency might for environmental reasons have sought mechanisms to promote state-federal cooperation to eliminate or diminish the financial "need" for additional federal drainage tract platforms such as that of Phillips Petroleum.

A different federal decision on Channel leasing might have resulted if USGS had obtained more information on the nature of the Channel floor. If proprietary information gathered at Secretary Hickel's request since the spill--material that has significantly helped the agencies and DuBridge

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143/ 33 Fed. Reg. 15916 (October 29, 1968).

144/ Id. There is no indication that the Office of Marine Resources is staffed and funded to become such a coordinator.

145/ Supra note 85.

panels--had been gathered before leasing, drilling regulation might have been more stringent 146/ and some federal tracts might not have been offered for sale. 147/

146/ For example, regulations on strict liability for cleanup might, as a result of new information on spill risks, have been spelled out before the spill. Similarly, casing requirements might have been stiffened. (New regulations now require more casing, with variances approved in Washington rather than by the USGS Regional Supervisor alone. OCS Order No. 10, *supra* note 51.)
The effect of stronger regulations, however, depends on more, and higher paid regional staff for USGS, permitting more adequate inspection and supervision of offshore drilling plans and operations.

147/ The first DuBridge panel has recommended that "through negotiation, purchase or possibly regulation, data necessary for resource evaluation held by private companies, state and local governments and any other parties to exploration and development of offshore mineral resources be made available to those who must make decisions about their exploitation." *Supra* note 139, at iii.

CASE STUDY NO. XII

WHEELER NATIONAL WILDLIFE REFUGE, ALABAMA

by

GEORGE COX

Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

INTRODUCTION

Construction of the National System of Interstate and Defense Highways, planned and initiated under the Federal-Aid Highway Act of 1956, has resulted in frequent conflicts of interest between highway and conservation groups. The system of Interstate Highways, as originally designed, involves approximately 41,000 miles of exclusively controlled-access highways designed to connect major population centers and scheduled for completion in 1972 (Fig. 1). Although this system will constitute only about one percent of the total highway mileage of the United States, it is projected to carry about 20 percent of total vehicle traffic.

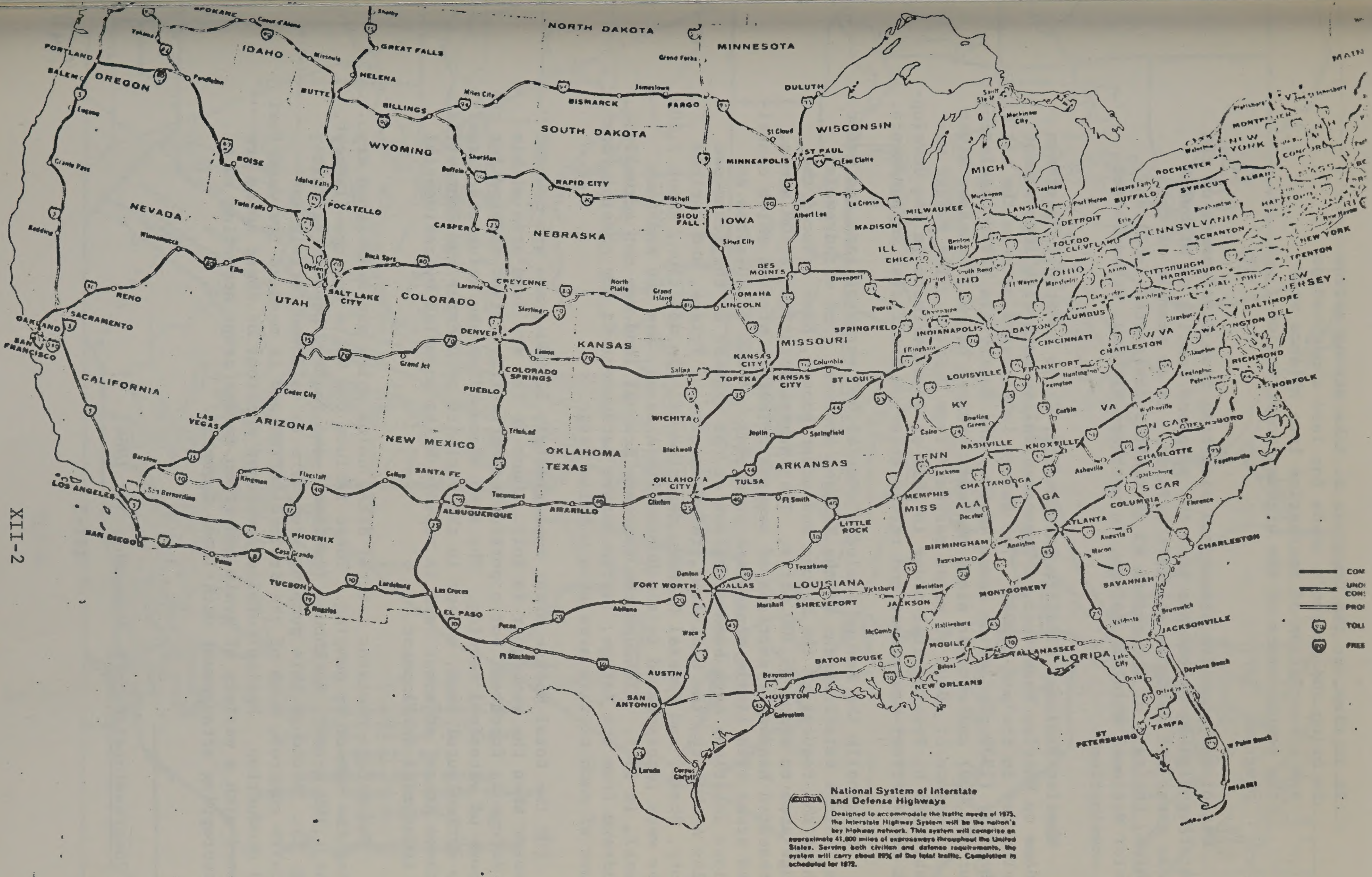
Conflicts with conservation interests have arisen primarily in connection with route selection for Interstate Highways. In many cases proposals have been made for routes crossing areas of public land set aside to protect wildlife or other significant features. In other cases routes have been proposed through, or closely adjacent to, areas of high scenic value. In these instances the probability of extensive topographic disturbance from the highway construction has raised the danger of serious ecological or esthetic damage to the area involved.

Construction of the Interstate Highway System will result in much greater impact on the American landscape than that suggested by the total highway mileage of the system 1/. Three-fourths of these highways will be constructed through new territory. Furthermore, the right-of-way for these highways is about nine times (300 feet) wider than rights-of-way for older highways (usually about 33 feet). As a result, about 30 acres are required for each mile of right-of-way for an Interstate Highway. Development of this system will probably increase the amount of land in highway rights-of-way by six to seven percent. It is likely that construction of interstate type highways will not cease with completion of the network as originally planned. Increase in population, car ownership, income and leisure time will likely precipitate a demand for even more extensive superhighway networks.

The frequency of conflicts between highway and conservation groups 2/ has led to serious concern by both conservation groups and governmental representatives over the policies and regulations governing highway location and construction. On September 14, 1966, Senator Edward Kennedy stated:

1/ Wing, William G., 1966, "The concrete juggernaut." Audubon Magazine, July-August.

2/ Wing, William G., 1966, "What to do before the highway comes." Audubon Magazine, Sept.-Oct.



National System of Interstate and Defense Highways

Designed to accommodate the traffic needs of 1975, the Interstate Highway System will be the nation's key highway network. This system will comprise an approximate 41,000 miles of expressways throughout the United States. Serving both civilian and defense requirements, the system will carry about 20% of the total traffic. Completion is scheduled for 1972.

Figure 1. National System of Interstate and Defense Highways.

> It is time for the Congress to take strong action to bring the Nation's needs for land conservation and preservation of recreation into balance with the requirements of the highway construction program. 3/

One of the specific situations resulting from development of the Interstate Highway System has been the proposed routing of highways across areas set aside as wildlife refuges. As an example of this problem, the case of Interstate 65 (hereafter designated I-65) and Wheeler National Wildlife Refuge, in northern Alabama, was selected for examination.

Wheeler National Wildlife Refuge (Fig. 2) is located in northern Alabama on Wheeler Reservoir, a Tennessee Valley Authority impoundment constructed in the mid-1930's. The Refuge is situated between the cities of Decatur (1970 population about 40,000) and Huntsville (1970 population about 160,000) and extends along the main channel of the Tennessee River for a distance of about 18 miles eastward from Decatur. The Refuge was established by Presidential order in 1938 as an experiment in the development of waterfowl management and refuge areas on artificial impoundments.

Originally the Refuge included over 45,000 acres of land and water area. Since establishment of the Refuge, however, land withdrawals, both at the request of the Refuge and other groups, have reduced the Refuge area to about 35,300 acres. The largest deletion, 4,500 acres, represented headwater portions of several tributary streams which constituted areas with little management potential. About 1,140 acres at various locations have been withdrawn at the request of the Tennessee Valley Authority, the U.S. Army, the Community of Triana, and various County, State, and Federal highway departments. In addition, about 7,500 acres were incorporated in the Huntsville Arsenal, now the Redstone Arsenal, in 1941. Although the Redstone Arsenal land was not actually withdrawn from the Refuge, little active management is now possible due to use of much of this area as a missile range.

Of the total Refuge area, approximately 22,000 acres are covered by water when the reservoir is full. Much of the dry land area within the Refuge is forested, but a portion is agricultural land managed for the purpose of waterfowl feeding. The area surrounding the Refuge is largely open agricultural land, except in the vicinity of Decatur and Huntsville. In these areas, adjacent land is rapidly being occupied by residential and industrial development.

The Refuge contains several diked units which are maintained dry during the summer by pumping. These include the White Springs (largest, about 1,100 acres), Rockhouse (smallest) and Buckeye Dewatering Units (Fig. 2). Although this pumping procedure is followed largely for mosquito control, much of the drained bottomland is managed for waterfowl food production. Agriculturally developed portions of these units are planted with a variety of grain and green forage crops according to a sharecropping arrangement with local farmers.

3/ Congressional Record, September 14, 1966.

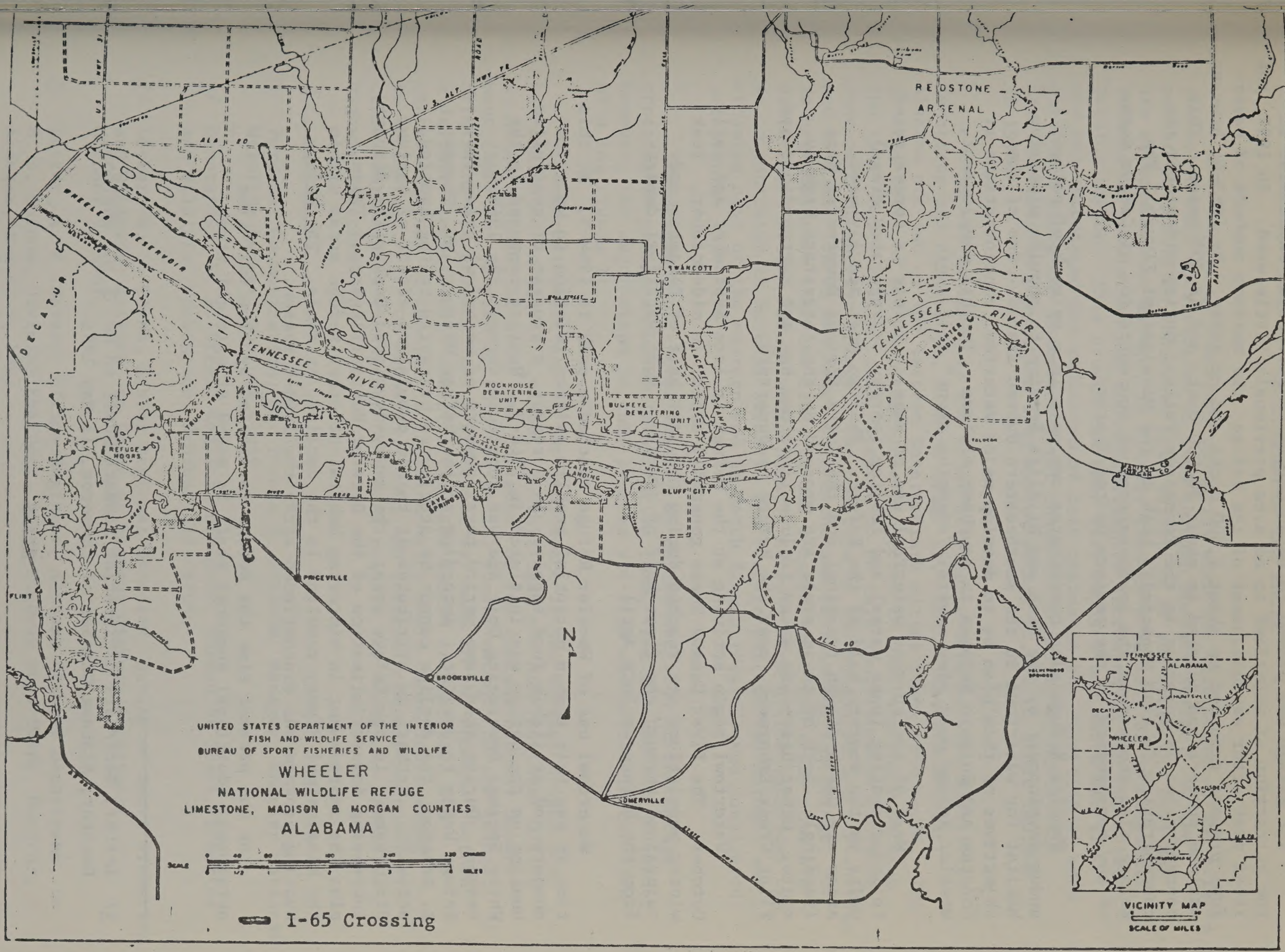


Figure 2. Location and boundaries of Wheeler National Wildlife Refuge, Alabama.

The Refuge has proved to be an unusually successful experiment in the attraction of waterfowl to an area previously little-used. In 1939, the first year after establishment of the Refuge, the maximum numbers of waterfowl present amounted to about 1,500 ducks and no geese. By 1963-4, however, maximum numbers had climbed to about 90,000 ducks and 48,000 geese. This concentration is greatest in the Tennessee Valley; during mid-winter the concentration is also especially high in the Mississippi Flyway. The Refuge also represents the southeasternmost concentration of Canada Geese of any consequence in the eastern United States.

Wheeler Refuge also constitutes one unit in a network of refuges under development by the Fish and Wildlife Service to provide wintering habitat for waterfowl in the southeastern United States. One of the objectives of this plan is to develop major waterfowl concentrations at Choctaw and Eufaula Refuges in southern Alabama. In this development, Wheeler Refuge must play a vital "stepping stone" role. 4/

Most of the current waterfowl use of Wheeler Refuge is concentrated in major resting (open water) and feeding (marshy or vegetated areas) units in the western half of the Refuge. The two most heavily used areas are Garth Slough (resting) and the White Springs Dewatering Unit (feeding). Both of these areas are crossed by the Interstate Highway route. Other heavy-use areas include Limestone Bay and surroundings and Flint Creek Embayment, near the Refuge headquarters.

Waterfowl begin arriving at the Refuge in late September and early October. The first Canada Geese generally appear in mid-October. Peak winter populations are reached during the last half of December and maintained through the first half of January. Most waterfowl depart from the Refuge by late April.

Waterfowl use of Wheeler Refuge reached a peak in 1964-5. At this time it was felt that a potential problem existed relating to waterfowl numbers and available food supply. As a result, a program of controlled hunting on the Refuge was initiated in 1964-5. Hunting centered in the White Springs Dewatering Unit and was continued through the 1968-9 season. During this same period total numbers of waterfowl using the Refuge began to decline. According to the Refuge Manager, Mr. Thomas Z. Atkeson, the decline cannot be attributed primarily to the hunting activity. Rather, he attributes it to the cumulative effect of various disturbances in the Refuge area: the newly-developed Huntsville Airport; increasing industrialization of the Decatur-Huntsville area. These, plus the improvement in wintering habitat at other refuge areas within the Mississippi Flyway resulted in the decline, he feels. The Refuge hunting program was discontinued after the 1968-9 season.

At the present time the Refuge is staffed by nine full-time personnel; additional seasonal staff is added at critical times.

4/ Letter, Secretary of Interior Stewart Udall to Mr. B. C. Shelton, Decatur, Alabama Chamber of Commerce, 11 May 1965.

1. RECITATION OF THE FACTS

This report is concerned primarily with the circumstances and effects connected with construction of I-65 through Wheeler Refuge. At the outset it should be indicated that selection of the route, as well as its effects on the Refuge, is closely tied to a variety of developments related to population and industrialization increases in the Huntsville-Decatur region. This growth has been very rapid since World War II and has encouraged the expansion of both cities in the direction of each other and along the Tennessee River channel. Since 1959, Huntsville has increased in population from approximately 70,000 to about 160,000 in 1970.

I-65 was designed as the major interstate link between Nashville, Tennessee and Birmingham, Alabama (Fig. 1). Huntsville and Decatur, Alabama are two of the largest intermediate cities along this route. The general route of I-65 was therefore projected to pass somewhere between the two. Any specific route selected to do this would involve crossing some part of Wheeler Refuge. The position of the Bureau of Sport Fisheries and Wildlife (BSFW) was never to prevent any crossing of the Refuge, but rather to insure that the crossing was located where the least possible disturbance of the Refuge would occur. Because much of the waterfowl use is concentrated in several areas in the western part of the Refuge, any crossing east of the eastern end of Garth Slough (Fig. 2) was considered acceptable. 5/

The sequence of events leading up to the decision on the Refuge crossing is presented below in narrative form. For the aid of the reader, however, the major steps in this process are also summarized in the form of a log (Table 1).

The formal selection of the I-65 route in the Wheeler Refuge area was initiated on August 3, 1960. On this date the BSFW Regional Office in Atlanta (BSFW, Atlanta) was contacted by the Alabama Highway Department (AHD) for permission to place aerial survey markers on the Refuge. 6/ Permission was granted, and a statement was made to the AHD that before a definite location was selected the BSFW wanted to meet with AHD representatives to consider a location which would cause least damage to the Refuge. 7/ On August 9, 1960, AHD internal correspondence indicated awareness by this group of a BSFW request for a mapped, tentative highway location. 8/

5/ Personal Communication, Mr. Thomas Z. Atkeson, Manager, Wheeler National Wildlife Refuge, Dec. 15, 1969.

6/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Washington, February 11, 1966.

7/ Letter, W. L. Towns, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to State of Alabama Highway Department, October 9, 1962.

8/ Letter, A. R. Harvey, Office Engineer, Alabama Highway Department, to H. D. Burnum, Division Engineer, State Highway Department, Decatur, Alabama, August 9, 1962.

TABLE I

Log of events leading to decision permitting I-65 crossing of Wheeler National Wildlife Refuge along route proposed by Alabama Highway Department.

Date	Event	Result
Aug. 3, 1960	AHD requests permission from BSFW, Atlanta for conduct of aerial surveys of preliminary I-65 route	Permission granted, but meeting to consider refuge interest requested
Oct. 9, 1962 Nov. 1, 1962	BSFW, Atlanta twice repeats request for tentative route information from AHD	AHD provided mapped tentative route location on Jan. 9, 1963
March 1, 1963	BSFW, Atlanta provided AHD with two mapped alternate routes and statement of concern about effects of refuge crossing	AHD initiated surveys and cost analyses of various routes proposed by AHD and BSFW
August, 1964	AHD requested extension of surveying permits by BSFW, Atlanta	Request denied, pending meeting between two groups
Sept. 29, 1964	Meeting held between AHD and BSFW, Atlanta	AHD presented arguments of higher construction and user costs for BSFW alternate routes
Dec. 18, 1964	Impact report of highway routes on refuge prepared by BSFW, Atlanta and submitted to AHD	AHD responded indicating that they could not agree with BSFW recommendations. AHD requested problem be referred to higher authorities
March 17, 1965	Public hearing on I-65 route held at Morgan City, Alabama	Statement approved by Secretary Udall presented, indicating that Interior would not approve AHD right-of-way
June 5, 1965	Secretary Udall corresponds with Commerce Secretary Connor explaining Interior objections to AHD route	Secretary Connor replies on June 18, 1965, emphasizing cost factors for alternate routes and suggesting meeting
July 19, 1965	Meeting held between Interior, BSFW, and BPR representatives	Discussion of evidence for disturbance of waterfowl, possibilities for refuge land addition, but no resolution of conflict

Date	Event	Result
Sept. 16, 1965	TVA support of BSFW route recommendation transmitted to AHD	BPR and AHD initiated construction design studies aimed at overcoming TVA objections
Oct. 18, 1965	Meeting between TVA and AHD representatives to discuss construction modifications	TVA indicated satisfaction with modified construction plans involving trestle-type roadbed
Jan. 28, 1966	Meeting between Interior, BSFW, and BPR representatives	BPR suggested trestle-type construction, winter cessation of construction, low speed limit for refuge crossing. Interior indicated that these suggestions would be studied
Feb. 25, 1966	BSFW, Atlanta submits evaluation of BPR construction proposals	BSFW, Atlanta concludes that modifications do not provide sufficient reason for withdrawal of route objection
March 11, 1966	AHD submits right-of-way request citing conditions mutually agreed upon	BSFW, Atlanta denies having suggested any such agreement
March 23, 1966	Assistant Secretary Cain refers in memo to Secretary Udall to reluctant acceptance of AHD route. Memo also sent to Director, BSFW, Washington	
April 15, 1966	BSFW, Atlanta first receives indication that Secretary Udall might approve AHD route	
May 5, 1966	Assistant Secretary Cain withdraws Interior objections to AHD route in letter to Federal Highway Administrator	

The tentative location of this route was not supplied by the AHD for over two years. In September, 1962, TVA was supplied with a map of the tentative route by the AHD. 9/ However, BSFW, Atlanta, found it necessary to repeat its request for this information on October 9 and November 1, 1962. 10/ In the letter of November 1, 1962, Mr. W.L. Towns, Acting Regional Director, BSFW, Atlanta, pointed out that under existing regulations pertaining to the granting of highway rights-of-way across Department of Interior lands, the applicant is expected, at the earliest possible date prior to the filing of an application, to consult with the officials of the Bureau having jurisdiction over the lands to ascertain whether or not the use of lands for right-of-way purposes is consistent with the management program and to agree to measures necessary to maintain program values. On November 29, 1962 a tentative location, virtually identical to the route finally selected, was supplied by the AHD. 11/ This AHD proposal suggested no alternatives and further indicated that final route selection was possibly two years away.

On January 9, 1963, the AHD requested BSFW, Atlanta, to indicate their preferred routes. 12/ On March 1, 1963, two mapped alternative routes were presented by the BSFW, Atlanta. These alternatives, #1 and #2, are shown in Figure 3. 13/ In a letter to the AHD on March 25, 1963, the relation of these routes to major waterfowl use areas of the Refuge is described, and a statement of the fact that the BSFW expected the highway to follow a route causing the least disruption of the Refuge is again made. 14/

During the remainder of 1963 and much of 1964, trial surveys of the various proposed routes were conducted by the AHD. On September 19, 1963, the Chief Engineer, AHD, indicated to the Division Engineer, BPR, that the AHD would cooperate with conservation interests in the case of

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9/ Memorandum, R. E. Lines, Regional Supervisor of Realty, Bureau of Sport Fisheries and Wildlife, Atlanta to Regional Supervisor of Refuges, Bureau of Sport Fisheries and Wildlife, Atlanta, Jan. 9, 1963.

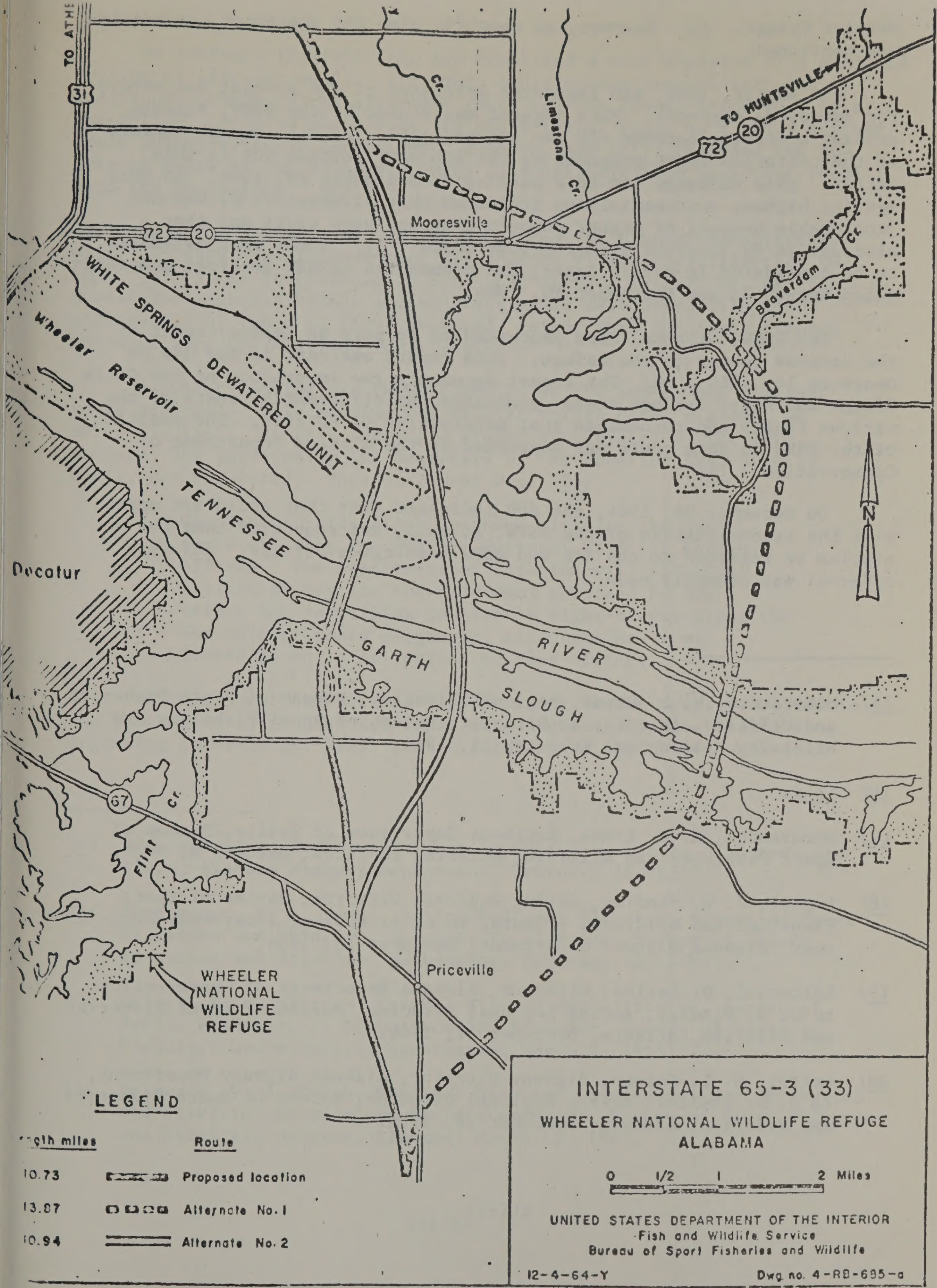
10/ Letter, W. L. Towns, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta to State of Alabama Highway Department, Nov. 1,1962.

11/ Memorandum, R. E. Lines, Regional Supervisor of Realty, Bureau of Sport Fisheries and Wildlife, Atlanta, to Regional Supervisor of Refuges, Bureau of Sport Fisheries and Wildlife, Atlanta, Jan. 9, 1963.

12/ Ibid.

13/ Memorandum, L. S. Givens, Regional Supervisor, Branch of Refuges, Bureau of Sport Fisheries and Wildlife, Atlanta, to Branch of Realty, Bureau of Sport Fisheries and Wildlife, Atlanta, March 1, 1963.

14/ Letter, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta to Mr. C.A. Bowles, Interstate Engineer, Alabama Highway Department, March 25, 1963.



gure 3. Wheeler Refuge crossing proposed by Alabama Highway Department and alter-
te routes proposed by the Bureau of Sport Fisheries and Wildlife.

Wheeler Refuge. 15/ However, no specific plan for achieving cooperation was mentioned.

In August, 1964, AHD requested extension of the special use permit for surveying purposes. This request was denied by the BSFW, Atlanta, pending a meeting between the two groups. 16/ The detrimental aspects of the tentative route proposed by the AHD were pointed out in this letter. This exchange led to a meeting on September 29, 1964. At this meeting highway representatives indicated that Alternative #1 was objectionable because of higher construction and user costs and that Alternative #2 involved higher bridge costs. 17/ These cost estimates, to be considered in detail later, are documented in AHD internal memoranda dated August 25 and September 10, 1964.

The BSFW, Atlanta, then proceeded to prepare an impact report of the various routes on the Refuge. This report was sent to the AHD on December 18, 1964. 18/ The report documents the importance of the Garth Slough and White Springs areas, evaluates the differential costs of the various routes and recommends that Alternative #1 be used. The position of the BSFW on this route was supported by the Alabama Department of Conservation. 19/

On December 29, 1964, the AHD indicated that they could not agree with the recommendation of the BSFW, Atlanta, and requested that the problem be referred to the BPR and BSFW Washington offices. 20/ This referral was promptly made.

15/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, February 11, 1966.

16/ Ibid.

17/ Memorandum, R. E. Lines, Regional Supervisor of Realty, Bureau of Sport Fisheries and Wildlife, Atlanta, to files, October 6, 1964.

18/ Letter, J. D. Findlay, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to C. A. Bowles, Interstate Engineer, Alabama Highway Department, December 18, 1964.

19/ Letter, C. D. Kelley, Director, Alabama Department of Conservation, to J. D. Findlay, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, December 31, 1964.

20/ Letter, H. L. Nelson, Highway Director, Alabama Highway Department, to J. D. Findlay, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, December 29, 1964.

On February 10, 1965, the AHD completed a cost analysis of a modified routing of Alternative #1. 21/ This modification reduced both the additional length of the alternate route and its construction cost by a connection, north of the Refuge, to the original route at a point further north than previously considered. However, AHD still regarded the increased costs of the alternate route as substantial and would not recommend its acceptance. 22/

On March 3, 1965, Mr. Rex Whitten, Federal Highway Administrator, wrote the BSFW, Washington, that Alternative #1 was unsatisfactory to FHA. 23/ It is interesting to note that in this letter, Mr. Whitten quoted the higher distance and cost estimates associated with the Alternative #1 route as first proposed, rather than the lower figures obtained from the modified route analysis.

A public hearing was then scheduled by the AHD on the original route proposal. This hearing was held at Morgan City, Alabama, on March 17, 1965. At this hearing a statement prepared by the BSFW, Atlanta, and approved by the Secretary of the Interior, Mr. Stewart Udall, was presented. This statement was: 24/

> Complete consideration has been given to the I-65 route crossing the Wheeler National Wildlife Refuge, Alabama. The Department of Interior will not grant a right-of-way for the alignment proposed by your office but is willing to grant a right-of-way along the Bureau's proposed alignment, Alternate No. 1 or Alternate No. 1 as revised by your office.

At this point the Secretary of Interior became deeply involved in the Wheeler case; it also developed into a general public controversy. Beginning on March 26, 1965, events relating to the Wheeler Refuge

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21/ Memorandum, R. E. Norton, Location Engineer, Bureau of Survey and Plans, Alabama Highway Department, February 10, 1965.

22/ Memorandum, W. L. Towns, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, February 12, 1965.

23/ Letter, R. M. Whitton, Federal Highway Administrator, Bureau of Public Roads, to J. S. Gottschalk, Director, Bureau of Sport Fisheries and Wildlife, Washington, March 3, 1965.

24/ Telegram, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Field Supervisor, Bureau of Sport Fisheries and Wildlife, Decatur, Alabama, March 17, 1965.

controversy were documented regularly in the Outdoor News Bulletin, published by the Wildlife Management Institute. 25/

On June 5, 1965, Mr. Udall wrote John T. Connor, Secretary of Commerce, discussing various points of the case and explaining the position of the Department of Interior. 26/ In this letter, Mr. Udall cited the position of President Johnson which he outlined in his White House Message on Natural Beauty. In reply, on June 18, 1965, Secretary Connor referred to the cost factors involved and proposed a high-level meeting on the case. 27/

This meeting was held on July 19, 1965. Mr. Whitten continued to mention the cost estimate for the longer version of Alternative #1 rather than the modified, shorter version. BSFW officials were questioned about evidence indicating that waterfowl disturbance would result from the highway. Mr. Whitten suggested the possibility of buying additional land, worth about $2-3 million, to mitigate the highway effects. 28/ Extensive consideration of possibilities for obtaining land important to the Refuge was then undertaken by the BSFW. These investigations indicated that useful land was extremely expensive and that acquisition in the particular areas involved would engender much ill-will in the Decatur area. 29/ BSFW, Atlanta, also felt that the effects of the highway might not be lessened simply by addition of land. Furthermore, since Department of Interior had to approve the right-of-way, forcing the selection of an alternate route represented the best strategy for protection of the Refuge interests. 30/

25/ Outdoor News Bulletin, 19(5):3 (March 12, 1965); 19(6):2 (March 26, 1965); 19(7):3 (April 9, 1965); 19(11):5 (June 4, 1965); 19(12):5 (June 19, 1965); 19(18):3 (Sept. 10, 1965); 20(7):3 (April 8, 1966); 20(11):2 (June 3, 1966).

26/ Letter, Secretary of Interior Stewart Udall, to Secretary of Commerce John T. Connor, June 5, 1965.

27/ Letter, Secretary of Commerce John T. Connor, to Secretary of Interior Stewart Udall, June 18, 1965.

28/ Memorandum, S. P. Davey, Acting Chief, Special Studies Branch, Division of River Basin Studies, to Chief, Division of River Basin Studies, July 20, 1965.

29/ Letter, T. Z. Atkeson, Manager, Wheeler Refuge, To Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, August 5, 1965.

30/ Personal communication, R. E. Lines, December 18, 1969.

On August 19, 1965, upon request, TVA expressed preference for Alternative #1, basing its preference on considerations relating to operation of the White Springs Dewatering Unit. 31/ This support, together with a detailed argument for acceptance of Alternative #1, was sent to Mr. Whitten, Federal Highway Administrator, on September 16, 1965. 32/ A series of construction design studies was then undertaken by highway groups to meet the objections cited by TVA. A meeting between highway and TVA representatives on October 28, 1965, produced an indication of satisfaction on the part of TVA. 33/ Thereafter, TVA was noncommittal in regard to the route controversy.

On January 14, 1966, inquiry by the Refuge Manager, Mr. Atkeson, indicated that right-of-way acquisition north of the Refuge was proceeding as far south as County Highway 24, and south of the Refuge as far north as State Highway 36. 34/ Since the distance between these points along the proposed right-of-way is about 20 miles, this acquisition probably still permitted the acceptance of the modified version of Alternative #1.

On January 28, 1966, a meeting between representatives of the Department of Interior, including Secretary Udall, and representatives of the BPR and BSFW, Washington, was held. At this meeting highway representatives suggested several construction modifications for their proposed route. These included a trestle-type roadbed across the White Springs Unit, suspension of construction during waterfowl use periods, and a reduced speed limit during the waterfowl season. Estimates by the AHD suggested that these modifications would increase bridge construction costs by slightly over $1 million. No decision was reached at this meeting, but Department of Interior representatives agreed to study the suggestions presented. 35/

31/ Letter, F. G. Lupfer, Manager, Southern Branch, TVA, to W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, August 19, 1965.

32/ Letter, J. S. Gottschalk, Director, Bureau of Sport Fisheries and Wildlife, Washington, to R.M. Whitton, Federal Highway Administrator, Bureau of Public Roads, Sept. 16, 1965.

33/ Memorandum, J. S. Logan, Division Engineer, Alabama Highway Department, to H. E. Stark, Regional Engineer, Bureau of Public Roads, October 28, 1965.

34/ Memorandum, T. Z. Atkeson, Manager, Wheeler Refuge, to Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, Jan. 14, 1966.

35/ Memorandum, W. E. Ackerknecht, Assistant Chief, Division of Wildlife Refuges to Director, Bureau of Sport Fisheries and Wildlife, Washington, February 3, 1966.

A formal evaluation of these suggestions was made by BSFW, Atlanta, and sent to the BSFW, Washington, on February 25, 1966. 36/ This report concluded that these modifications did not represent sufficient reason for a change in the BSFW position against the AHD route.

On March 11, 1966, BSFW, Atlanta, received a right-of-way request from the AHD. This request referred to conditions agreed upon by the parties involved relating to construction design. This request was brought to the attention of the BSFW, Washington, accompanied by a denial that any such agreement had been made by BSFW, Atlanta. 37/

However, at some time during March, 1966, or perhaps earlier, such an agreement was apparently made at the level of the Secretary of Interior. A March 23, 1966, memorandum from Assistant Secretary Cain to Secretary Udall refers to a meeting, undated, at which reluctant acceptance of the AHD route was indicated. 38/ An official communication, indicating the withdrawal of objection by Interior to the AHD route was, however, not sent to Mr. Whitton until May 5, 1966. 39/

The final decision in this case was apparently not influenced by actions of private conservation-minded groups. In particular, conservation groups in the Huntsville-Decatur area were poorly organized at the time. Only one individual, Mr. Robert Shanks of Huntsville, spoke in favor of the BSFW position at the March 17, 1965, hearing in Morgan City, Alabama. 40/

Economic and political considerations seem, however, to have played the critical role in the final decision. The AHD route was favored by an influential group of individuals in Decatur. On April 21, 1965, a group representing the Decatur Chamber of Commerce and consisting of the publisher of the Decatur Daily, the Speaker of the Alabama House of Representatives, the Mayor of Decatur and others, wrote Secretary Udall outlining Decatur area interests in the highway. In reply, on May 11,

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36/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, Feb. 25, 1966.

37/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, March 11, 1966.

38/ Memorandum, S. A. Cain, Assistant Secretary for Fish and Wildlife and Parks, to The Secretary (of Interior), March 23, 1966.

39/ Letter, S. A. Cain, Assistant Secretary for Fish and Wildlife and Parks, to R. M. Whitton, Federal Highway Administrator, Bureau of Public Roads, May 4, 1966.

40/ Personal communication, Robert Shanks, December 16, 1969.

1965, Secretary Udall presented in detail the considerations important to Wheeler Refuge, strongly supported the alternate route and indicated that approval of the AHD route would not be granted. 41/

Considerable circumstantial evidence exists that the decision to permit the Refuge crossing along the AHD route was largely the result of political considerations. Members of the United States Congressional Delegation from Alabama, especially Congressman Robert E. Jones and Senator Sparkman, were well-informed on the progress of this controversy and contacted representatives of the BSFW and Department of Interior in connection with the decision. Of these two, Congressman Jones appears to have been the most closely involved. During the 89th Congress, during which the final decision was made, he was a member of the House Committee of Public Works. His membership on this Committee is, however, of long standing. This Committee is concerned generally with federally-financed public developments including federal highways and water resources (irrigation, flood control, water pollution). Congressman Jones was a member of the Subcommittee on Roads, which is concerned with development of the Interstate Highway System, and was Chairman of the Subcommittee on Flood Control.

Mr. Jones was familiar with the Wheeler Refuge - I-65 problem as early as December 22, 1964. On this date he telephoned BSFW, Washington, for information on the Wheeler right-of-way. 42/ On December 29, 1964, the Director of AHD wrote to Congressman Jones and enclosed the impact report prepared by BSFW, Atlanta (Dec. 19, 1964), expressing the opinion that the alternate route was not justified. The Director requested Jones' help in resolving the situation. 43/

On January 5, 1965, Mr. F. C. Gillette, Chief of the Division of Refuges, placed a call to one of Congressman Jones' staff, Mr. Milstead. Mr. Milstead reported that Congressman Jones would not let any ducks stand in the way of the road, and that he (Jones) was ready to go to Secretary Udall if necessary. 44/

41/ Letter, Secretary of Interior Stewart Udall to B. C. Shelton, Decatur, Alabama, Chamber of Commerce, May 11, 1965.

42/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, February 11, 1966.

43/ Letter, H. L. Nelson, Director, Alabama Highway Department, to Congressman Robert E. Jones, Washington, Dec. 29, 1964.

44/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, February 11, 1966.

On March 10, 1965, the Acting Director, BSFW, Washington, wrote Secretary Udall that Congressman Jones had expressed interest in an early granting of the right-of-way along the route proposed by the AHD. 45/ Correspondence dated May 3, 1965, also indicates that Senator Sparkman had talked with Udall and expressed interest in a settlement of the problem. 46/

On July 30, 1965, a memorandum from the Regional Director, BSFW, Atlanta, to the Director, BSFW, Washington, stated that both Congressman Jones and Senator Sparkman had indicated they would take a neutral position in the dispute. 47/ However, intradepartmental correspondence of the BPR on December 14, 1965, states that Congressman Jones had contacted the White House and expressed opposition to the route sought by Interior, and that both he and Senator Sparkman were asking for help. 48/

Interviews with former officials of the Department of Interior shed little light on this decision. Dr. Stanley Cain, formerly Assistant Secretary for Fish and Wildlife and Parks, stated that he had no knowledge of political pressure or trading of interests in the case of this decision. In his opinion the decision reflected a lack of alertness by Refuge personnel to the growing problem and the presentation of a case weak in demonstration of serious effects and acceptable alternatives. 49/ Former Secretary Udall indicated that both Jones and Sparkman had talked to him and placed him under pressure to grant the right-of-way but gave no indication of the nature of the pressure beyond the circumstances relating to the costs and length of the various routes. 50/

Dr. Ira N. Gabrielson, President, Wildlife Management Institute, states, however, that there was suspicion in Washington that a trade was made by someone in the office of the Secretary of Interior with a Congressman from Alabama. Dr. Gabrielson was not aware of the details of the reported trade, but did note that considerable bitterness developed within the Fish and Wildlife Service as a result of the decision. 51/

45/ Memorandum, A. V. Tunnison, Acting Director, Bureau of Sport Fisheries and Wildlife, Washington, to Secretary of Interior Stewart Udall, March 10, 1965.

46/ Memorandum, O. Beaty, Assistant to the Secretary of Interior to Director Gottschalk, Bureau of Sport Fisheries and Wildlife, Washington, May 3, 1965.

47/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, July 30, 1965.

48/ Memorandum, L. Jones to R. M. Whotton, Federal Highway Administrator, Bureau of Public Roads, Dec. 14, 1965.

49/ Personal communication, S. A. Cain, Dec. 12, 1969.

50/ Personal communication, Stewart Udall, Jan. 2, 1970.

51/ *In litt.*, December 23, 1969.

Of further interest is the fact that the decision made at the level of the Secretary of Interior was not immediately made known at all levels of the BSFW. This decision was made some time prior to March 23,1966. On this date, a memorandum from Assistant Secretary Cain to Secretary Udall refers to a meeting with Mr. Whitton at which reluctant acceptance of the AHD route had been indicated. 52/ On March 25, 1966, a memorandum from the Chief, Division of Refuges, to the Director BSFW, Washington, indicated that in a conversation with a member of Congressman Jones' staff, he had been informed that an agreement to accept the AHD route had been known to Congressman Jones for "a week or so." 53/ This memo also noted that Jones reported that he had just returned from a 10-day trip to Germany with Secretary Udall.

Although a carbon copy of the March 23, 1966 memorandum noted above was sent to the Director, BSFW, Washington, officials of the Division of Wildlife Refuges had not received word by March 25. 54/ It was not until April 15, 1966, that BSFW, Atlanta, received indications that Secretary Udall might accept the AHD route.

2. ENVIRONMENTAL IMPACT

In the case of this study, a full evaluation of the impact of I-65 on Wheeler Refuge cannot yet be made. Although approved, the highway is still in preliminary stages of construction. The portion of the roadbed to be constructed on dirt fill is nearly completed to the edge of the river-bottom areas adjacent to the reservoir. Construction of the bridge over the main river channel and the trestle-roadbed over bottom-land areas of the White Springs unit has only begun. This section will involve a 10,000' length of bridge and roadbed elevated on concrete pilings (Fig. 4). Maximum height of the bridge is expected to be 70' above water level; the elevated roadbed will be about 30' above ground surface.

Principal impacts feared because of this interstate crossing include: inactivation of Refuge land taken by the right-of-way; disturbance of waterfowl feeding, resting and movement by construction activities; permanent disturbance of feeding, resting, and movement by vehicular traffic on the completed highway.

The total Refuge area included in the highway right-of-way is 68.05 acres. 55/ Land removed by the right-of-way includes primarily water,

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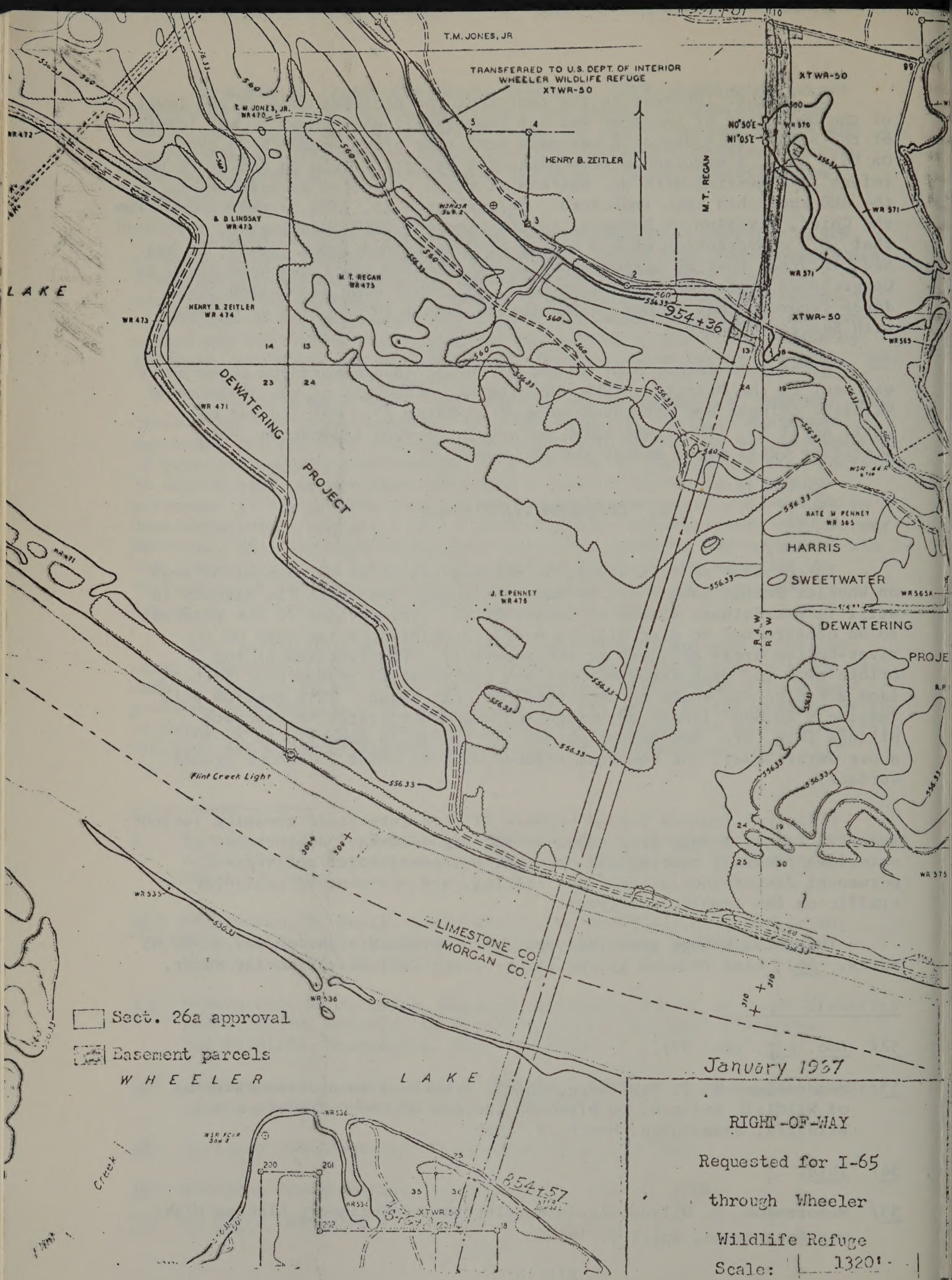
52/ *Loc. cit.* (No. 37).

53/ Memorandum, B. P. Stollberg, Chief, Branch of Resources, Division of Wildlife Refuges, to Director, Bureau of Sport Fisheries and Wildlife, Washington, March 25, 1966.

54/ *Ibid.*

55/ Memorandum, O. Wilson, Assistant Interstate Engineer, Alabama Highway Department, April 2, 1965.



Sect. 26a approval

▨ Easement parcels

January 1967

RIGHT-OF-WAY

Requested for I-65

through Wheeler

Wildlife Refuge

Scale: 1320'

Figure 4

mud flat, bottomland marshland, forest and agricultural land. Even if this loss were compensated for by purchase of other land to be added to the Refuge, the added land would not have the same character. The only available land is upland, agricultural land, which if developed as a waterfowl feeding area, would benefit only certain species of all the waterfowl using the Refuge.

Waterfowl disturbance during the construction period was considered a serious threat. This concern was conveyed to AHD early in discussions of the route. The portion of the year involved was October 1 through March; the AHD indicated that during these months operations involving use of heavy equipment would be suspended. 56/ In the final agreement 57/all construction was to be suspended during the months of November through February. The BSFW had requested that if a four-month suspension were established, the period be October through January, since waterfowl arrivals begin in October. October is, however, one of the best months of the year for construction activity in Alabama. Thus, the construction moratorium arrangement may still create severe disturbance of waterfowl during the period of early fall arrival of birds at the Refuge.

Some permanent disturbance resulting from the highway structure and vehicular traffic was also feared. In open water areas used by waterfowl for resting, observations of the author indicated that few resting birds utilize the open water areas within about 1/2 mile of the twin bridge and causeway crossing of the Tennessee River (by Alabama 20 at the edge of Decatur) constituting the western edge of the Refuge. This observation is generally confirmed by observations of Refuge personnel. The elevated Refuge crossing by I-65 is quite different in structure from the Alabama 20 crossing. Elevation of the traffic above water level may reduce the extent of disturbance of resting birds. Although the extent cannot be evaluated, some avoidance of the bridge vicinity by resting birds will certainly occur.

In areas used for feeding, observations by Refuge personnel suggest that Canada Geese, especially late in the winter, will approach close to highway banks to feed as long as traffic does not stop. Thus, the direct disturbance of feeding activities appears not to extend to areas beyond those taken up by the highway right-of-way itself.

The most serious possibility involves possible interference by the bridge structure with waterfowl movements between resting and feeding areas. Garth Slough, one of the principal resting areas, and White Springs, a major feeding area, are separated by the highway crossing. Refuge personnel report that waterfowl crossing the Alabama 20 bridge

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56/ Memorandum, W. F. Land, Interstate Engineer, Alabama Highway Department, September 30, 1964.

57/ Letter, W. L. Towns, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to F. G. Lupfer, Tennessee Valley Authority, June 14, 1966.

and causeway over the Tennessee River channel generally cross over the causeway section, where the roadbed is close to water level, rather than over the elevated bridge structure. Waterfowl have also been observed to turn back when encountering high tension wires over the river. Thus, the I-65 bridge may interfere with movements of waterfowl between major resting and feeding areas.

Of additional concern is interference of the highway structure with movement of birds into and out of the Flint Creek embayment near the Refuge headquarters. The situation in this case demonstrates that the effects of various developments in the Refuge area are likely to interact to the detriment of the Refuge. The route of I-65 reaches the south bank of the main river channel near the east bank of the Flint Creek embayment. The west bank of this embayment consists of a 450-acre section which was formerly managed as part of the Refuge under a special arrangement with TVA permitting its withdrawal for industrial development or other use. This area was withdrawn in early 1969 for development by the City of Decatur as Point Mallard Park, a recreational and amusement facility. The route of I-65 and the development of this area thus produce disturbance conditions on both sides of the entrance to the Flint Creek embayment. Refuge personnel state that the birds entering the Flint Creek area do so by following the water channel. Serious interference with waterfowl movements in this area is, thus, a possibility.

In connection with these potential effects, it should be noted that no studies have been conducted at the Refuge to evaluate specific impacts of the highway in relation to the above points.

It was indicated earlier that effects of the I-65 development are closely tied to those of other developments in the Huntsville-Decatur area. Thus, in the past few years several developments have produced a generally increased level of disturbance in the Refuge vicinity. The recently-completed Huntsville Airport was designed with approach and take-off patterns overlying the Refuge. Development of residential areas adjacent to Refuge boundaries has been extensive near Decatur. The Huntsville Industrial Expansion Committee has requested the use of Refuge lands along the north side of the Tennessee River Channel between Triana and Blackwell Swamp. A dock with facilities for unloading jet fuel for the Huntsville Airport is one specific development planned for this area. In addition, about 7,500 acres of land, contained within the boundaries of the Redstone Arsenal, are subject to use as a firing and missile range. 58/

The most severe effect of the interstate will probably be a long-range one. The highway will encourage further industrial growth in the Huntsville-Decatur area and intensify the pressures from developments such as those cited above. Specifically, demand for construction of exits from the main interstate highway for an access road for Point Mallard

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58/ Personal communication, Mr. T. Z. Atkeson, Refuge Manager, December 15, 1969.

Park or for an expressway for Huntsville may arise. Such developments might be proposed within the Refuge or for areas adjacent to the Refuge boundary.

3. PROBLEM ORIGINS

The problem involving the location of I-65 arose basically as a result of rapid growth of population and industry in the Huntsville-Decatur area, conflict of objectives of various governmental groups working in the area and vaguely-defined guidelines for coordination of activities of different governmental groups.

In the development of Wheeler Refuge, BSFW has spent approximately $1.3 million in the creation and maintenance of waterfowl habitat. 59/ As a result of the development of the Refuge, the duck and goose hunting has assumed major importance in the area. Formerly, this sport was of minor importance. The opportunity for hunting represents an economic asset for the region probably creating economic input into the region from the sale of goods and services to hunters attracted to the Huntsville-Decatur area.

Thus, to whatever extent the highway reduces waterfowl use of the Refuge area, federal highway funds will cancel the effectiveness of funds previously invested in the development, maintenance and future activity of the Refuge.

One weakness characterizing a number of National Wildlife Refuges is lack of full jurisdiction by the Bureau of Sport Fisheries and Wildlife. 60/ In the case of Wheeler Refuge, acreage withdrawn by TVA and leased to the City of Decatur for development of Point Mallard Park exemplifies this problem. While this situation does not directly relate to the I-65 problem, interaction between these two disturbing developments poses a potential problem for the Refuge.

4. ENVIRONMENTAL CONSIDERATIONS

Environmental impact of the suggested routes for the I-65 crossing of Wheeler Refuge was largely conducted on the basis of general information about waterfowl use of the Refuge. The evaluation of possible

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59/ Letter, Secretary of Interior Stewart Udall to B. C. Shelton, Decatur, Alabama, Chamber of Commerce, May 11, 1965.

60/ Leopold, A. S., C. Cottam, I. McT. Cowan, I. N. Gabrielson, and T. L. Kimball, 1968. "The national wildlife refuge system." Trans. 33rd N. A. Wildlife Conf., 30-54.

impact was thus largely subjective. The position of the BSFW was presented through correspondence with representatives of the AHD, BPR, and TVA, and through meetings involving representatives of the various groups. The possible effects recognized by the BSFW included loss of waterfowl habitat taken by the highway right-of-way, disturbance during the construction phase and from vehicular traffic on the completed highway of feeding, resting and movement of waterfowl.

Arguments presented by the BSFW centered on the importance of the White Springs Dewatering Unit for feeding and the importance of Garth Slough for resting. However, little quantitative data was presented to document the importance of these areas. The following statement was made to R. M. Whitton, Federal Highway Administrator, on these areas:

> These two areas are the best situated and most heavily used waterfowl locations within the refuge. The major movement pattern of waterfowl within the refuge is between these two areas. Fifty percent of the total goose concentration on the refuge during any particular year can be found on Garth Slough in the midday hours. Both locations are the scene of heavy duck use. They are of added importance in that with the food and water available they support species of ducks which do not feed on upland areas. 61/

The data on waterfowl numbers mentioned above were obtained primarily by visual counts made from a small plane at weekly intervals. These data have been collected since the establishment of the Refuge. Prior to 1965, however, counts were recorded only for the Refuge as a whole. Since then, counts for the Garth Slough and White Springs areas have been separately recorded. The estimated percentage of geese in the Garth Slough area, noted above, was apparently an estimate made by experienced Refuge personnel.

In preparing this report, the author compiled data on Canada Goose use of the White Springs and Garth Slough areas, together with data for the Refuge as a whole (Table 2). These data during years when separate counts were kept for Garth Slough indicate that the percentage of geese in this area is closer to 35-40%. Data in this table for the years 1960-64 represent estimated fractions of the total geese in the two areas and are taken from a statement of the effects of the interstate crossing prepared by the Refuge Manager for the BSFW, Atlanta (undated).

These counts, taken generally at about 11:00 a.m., demonstrate the importance of the Garth Slough resting area. Between 1965 and 1969, from 27% to 40% of the total Canada Goose population of the Refuge occurred at this location during census periods. These counts give a poorer indication of the importance of the White Springs area, since much of the feeding activity of the waterfowl involved occurs in the early morning and evening.

61/ Letter, J. S. Gottschalk, Director, Bureau of Sport Fisheries and Wildlife, Washington, To R. M. Whitton, Federal Highway Administrator, Bureau of Public Roads, Sept. 16, 1965.

TABLE 2

Data, in thousands of geese or goose-days, on use of the entire refuge and the White Springs and Garth Slough sections. This summary is for Canada Geese only, and for the period October 1 - February 28.

	ENTIRE REFUGE			GARTH SLOUGH				WHITE SPRINGS			
Season	Average Weekly Total	Total Goose-Days	Peak Number	Average Weekly Total	% of Total	Total Goose-Days	Peak Number	Average Weekly Total	% or Total	Total Goose-Days	Peak Number
1960-61	34.8	5,255	43	5.2	15%	780	15	2.1	6%	300	5
1961-62	29.4	4,439	43	6.8	23%	1,000	18	3.5	12%	525	7
1962-63	26.1	3,941	45	8.6	33%	1,300	25	4.4	17%	680	10
1963-64	40.8	6,161	58	9.8	24%	1,500	30	4.9	12%	750	16
1965-66	35.8	5,406	45	9.5	27%	1,435	14	4.4	12%	664	8
1966-67	32.9	4,968	47	12.2	37%	1,842	22	1.6	5%	242	3.5
1967-68	37.7	5,693	45	13.4	35%	2,023	20	3.6	10%	544	7
1968-69	27.9	4,213	37	9.5	35%	1,435	18	1.5	5%	227	7
1969-70*	19.5	2,945	30	7.8	40%	1,178	13	.6	4%	91	1

* Extrapolated to entire season from data through December 15

Documentation of the disturbing influence of the highway and of highway construction on waterfowl activity and movements was also largely on a subjective basis. Representatives of the BSFW, Atlanta, indicated that situations involving highways at other refuges were not comparable enough to the Wheeler situation to provide useful projections. 62/ Nevertheless, representatives of the BSFW considered the information available strong enough and the chance of detrimental effects great enough, to recommend a strong stand against granting the AHD route. 63/

However, the author of this report feels that the lack of extensive quantitative data on waterfowl use of the various parts of the Refuge, and on patterns of waterfowl movement, and the failure of the BSFW to initiate such studies, proved detrimental in three main ways.

First, it is apparent from examination of AHD and BPR correspondence that highway representatives remained unconvinced of the probability of a serious impact of the highway on waterfowl. Highway representatives on several occasions questioned the documentation suggesting possible waterfowl disturbance. It seems likely that availability and presentation of hard evidence for such effects by the BSFW representatives would have encouraged a more favorable response by highway representatives to the BSFW alternate route.

Secondly, hard data on patterns of waterfowl use and movements at Wheeler Refuge would also have placed the BSFW in a better position within the Department of Interior, particularly if such data suggested the likelihood of disturbance. In the light of such evidence, the Secretary of Interior could not easily have permitted the highway crossing on the basis of other considerations.

Finally, the lack of hard data on patterns of waterfowl movements and Refuge use in the area of the highway crossing makes an accurate evaluation of the effects of the highway crossing virtually impossible. The major trends in waterfowl numbers at the Refuge over periods of years, together with the increase in sources of disturbance to wildlife in the Huntsville-Decatur area prohibit any overall change in Refuge waterfowl populations from being attributed primarily to the highway crossing.

In the final design of the highway, two major modifications considered important by the BSFW were included. Originally, the river crossing was designed as a bridge 3,650 feet in length with an approach across the White Springs Unit consisting of a dirt-fill roadbed. In order to provide for free interchange of water and to avoid problems with the drainage system important in the dewatering operation, a modified trestle

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62/ Memorandum, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to Director, Bureau of Sport Fisheries and Wildlife, Washington, July 30, 1965.

63/ Personal communication, W. L. Towns, December 18, 1969.

construction was developed for the White Springs Unit. Thus the Refuge crossing now includes a 10,000' bridge and roadway section elevated on concrete pilings (Figure 4).

The second modification was an agreement to suspend construction activity during the period from November 1 to March 1. This modification was made to reduce waterfowl disturbance during the actual construction process.

5. ALTERNATIVES

The serious possibility of disturbance of the major waterfowl use areas of Wheeler Refuge could have been avoided by AHD acceptance of Alternate #1 route suggested by BSFW, Atlanta. This Alternate, together with a second, was submitted to the AHD on March 25, 1963. 64/ At this time it was pointed out that the AHD route would bisect a major waterfowl use area and destroy a large area of agricultural land much needed in the management program. Alternate #1 was described as passing through some agricultural land but no major waterfowl concentrations, while Alternate #2 was thought less detrimental because it was located at the edge of the White Springs unit.

Analysis of the additional distance and costs related to these alternate routes was conducted by the AHD (Table 3). Based on this analysis the AHD objected to Alternate #1 because it appeared to be over $3 million more in right-of-way and construction costs and over 3 miles longer, thus increasing "road user costs," a figure computed on the basis of traffic volume, distance, and an average cost per mile of vehicle driving. Alternative #2, although not much longer in distance, involved higher costs in bridge construction. 65/

On February 10, 1965, the AHD derived cost estimates for a modified version of Alternate #1 which reduced the extra distance to about 2½ miles and the extra construction and right-of-way costs to about $2.4 million. 66/

After formal evaluation of the routes, BSFW recommended Alternate #1, or Alternate #1 (modified), since this route did not pass through major

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64/ Letter, W. A. Gresh, Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to C. A. Bowles, Interstate Engineer, Alabama Highway Department, March 25, 1963.

65/ Memorandum, W. F. Land, Interstate Engineer, Alabama Highway Department, Sept. 30, 1964.

66/ Memorandum, R. E. Norton, Location Engineer, Bureau of Survey and Plans, Alabama Highway Department, February 10, 1965.

TABLE 3

Estimates of costs and right-of-way acreages required for the AHD route and various alternate routes proposed by the BSFW.

	Length (miles)	ROW Acreage*	Construction and ROW costs	Yearly road user costs	Amortization of various costs
September 10, 1964					
Proposed	10.73	68.05	11,503,965	3,406,163	592,747
Alternate #1	13.87	55.99	14,679,533	4,364,062	760,393
Alternate #2	10.94	79.26	13,995,850	3,455,923	696,067
February 19, 1965					
Proposed	18.31	68.05	15,506,838	5,382,373	847,478
Alternate #1 (modified)	20.80	55.99	17,911,307	6,061,422	1,032,656

* Based on estimates prepared on April 2, 1965

waterfowl use areas and specifically did not separate the Garth Slough and White Springs areas. 67/

In regard to the cost analyses conducted by AHD, a number of criticisms can justifiably be raised. These criticisms suggest that the BSFW alternative routes were incompletely evaluated. For example, in the analysis presented by the AHD (Table 3), user costs are computed only on the assumption of traffic following a northward or southward course along the interstate route itself. In fact, however, much of the traffic on this section involves local traffic to or from Huntsville or Decatur. Thus the distance from the interstate route itself to these cities should be an important factor in such a cost analysis. As located, the route passes close to Decatur, the smaller of the two cities. Since Huntsville is nearly four times as large as Decatur in population, movement of the highway route toward Huntsville would presumably shorten the access distance for four times as much traffic (to Huntsville) as it at the same time lengthens (to Decatur). In any case, it would certainly seem that to optimally serve both cities through minimizing costs over access roads from the interstate route, the latter should be located closer to Huntsville than to Decatur, and thus more nearly along the alternate route proposed by the BSFW, It would seem that an estimate of this cost should have been requested or computed by the BSFW.

Secondly, in proposing the acceptance of the original AHD route with modified trestle-roadbed construction and suspension of construction of the highway during the winter months, no evaluation was made of the total implication of these changes on the construction cost of the highway section involved. The total extra cost of Alternate route #1 (modified) was $17.9 million, approximately $2.4 million more than the cost of the AHD route. Addition of the trestle-roadbed feature increased the cost of the AHD route by about $1.0 million. In addition, the suspension of construction during the winter must certainly have increased the costs for the highway contractor. The suspension involves removal of facilities and equipment for a four-month period and then re-installation throughout the construction years. In addition, the time of construction is lengthened --a factor which will further increase costs due to increases in materials prices and wages. In addition, a user-cost is involved here, since delay in the opening of the interstate section requires vehicles to follow less direct routes for a longer time.

The final routing decision did not, furthermore, reimburse BSFW for land taken in the right-of-way across the highway. The amount of Refuge land in the AHD right-of-way was more than that in the Alternate #1 route.

Recently, a two-hearing procedure has been adopted for the consideration of interstate highway routes. The first hearing is concerned with

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67/ Letter, J. D. Findlay, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta, to C. A. Bowles, Interstate Engineer, Alabama Highway Department, December 18, 1964.

the selection of a route "corridor," or general location, while the second involves specific location and design considerations. 68/ Had this system been in effect at the time of the development of the I-65 route, the Refuge crossing problem might have been solved earlier with an arrangement more satisfactory for the Refuge. In the first corridor hearing, considerations not only of Wheeler Refuge would have been raised, but of the City of Huntsville and Decatur as well. In considering formally the location of the route in the best interests of both Cities, it is likely that a corridor further east than the present route would have been deemed more logical.

The basic problem in the entire Wheeler Refuge-I-65 conflict was the absence of an organized, broadly-based system for selection of interstate routes. Although the various highway departments involved operate according to a variety of guidelines and claim to consider many values, including wildlife, in their route selection, no system exists at present to insure that these considerations are impartially made. For this reason route selection is easily subject to political pressure and the lobbying of special interest groups.

A feasible alternative to past methods of route selection has been suggested and utilized by Ian McHarg, a Philadelphia Landscape Design specialist. 69/ In McHarg's view, a highway is considered a major public investment which will affect the economy, the way of life, health and visual experience of the population served. For him the optimal route would provide the maximum social benefit at the least social cost. In evaluating possible routes, therefore, it is simply inadequate to balance construction, maintenance and financing costs against savings in time, operating costs and safety. In addition, a large number of natural, cultural, scenic and historical values must also be considered.

68/ Statement of the Conservation Foundation on proposed regulations of the Federal Highway Administration, November 19, 1968.

69/ McHarg, Ian, 1969, Design with Nature. Natural History Press, Garden City, New York, ix + 198 pp.

Wheeler Refuge Case Study
George W. Cox
January 9, 1970

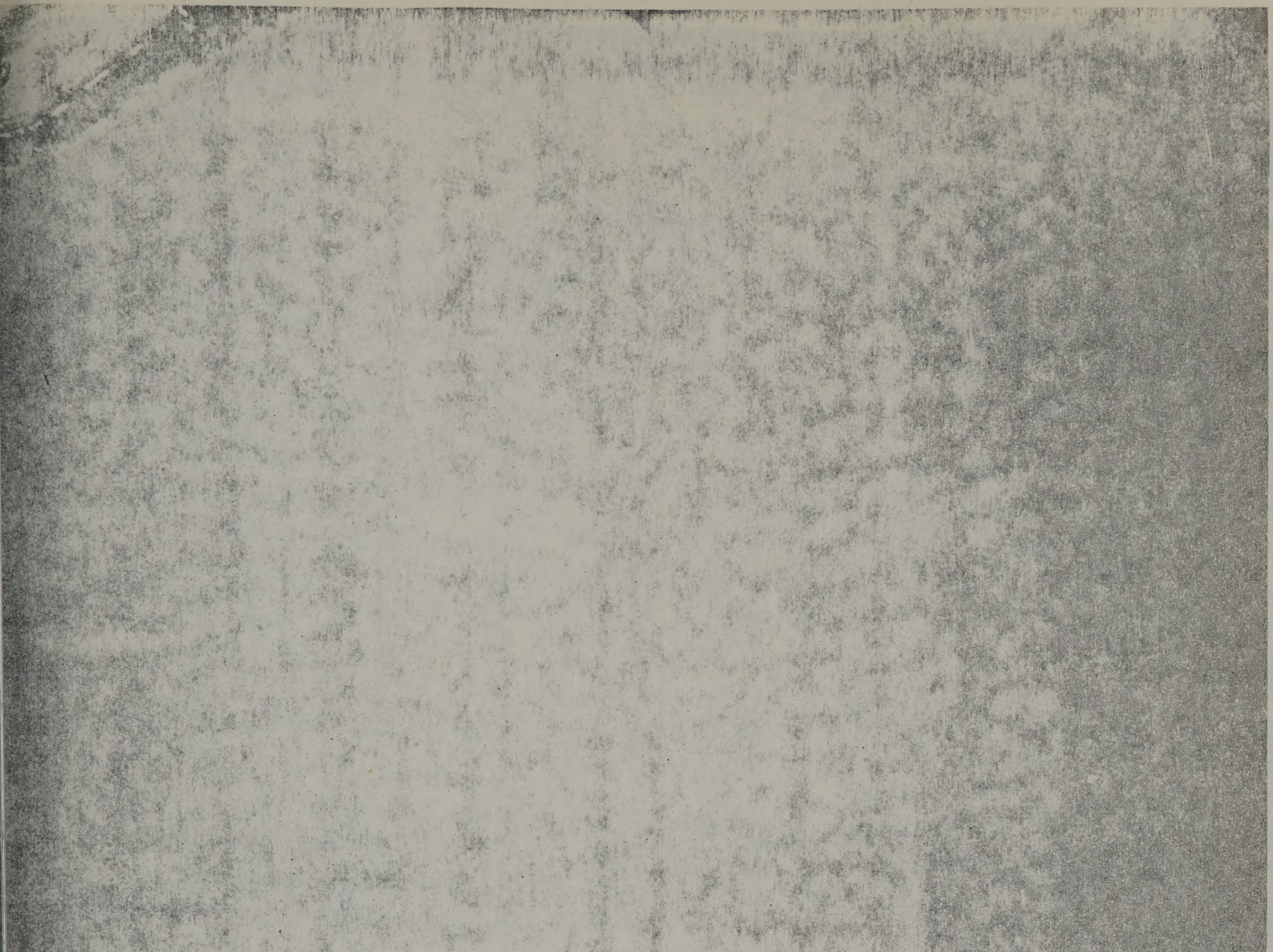
List of Persons Interviewed

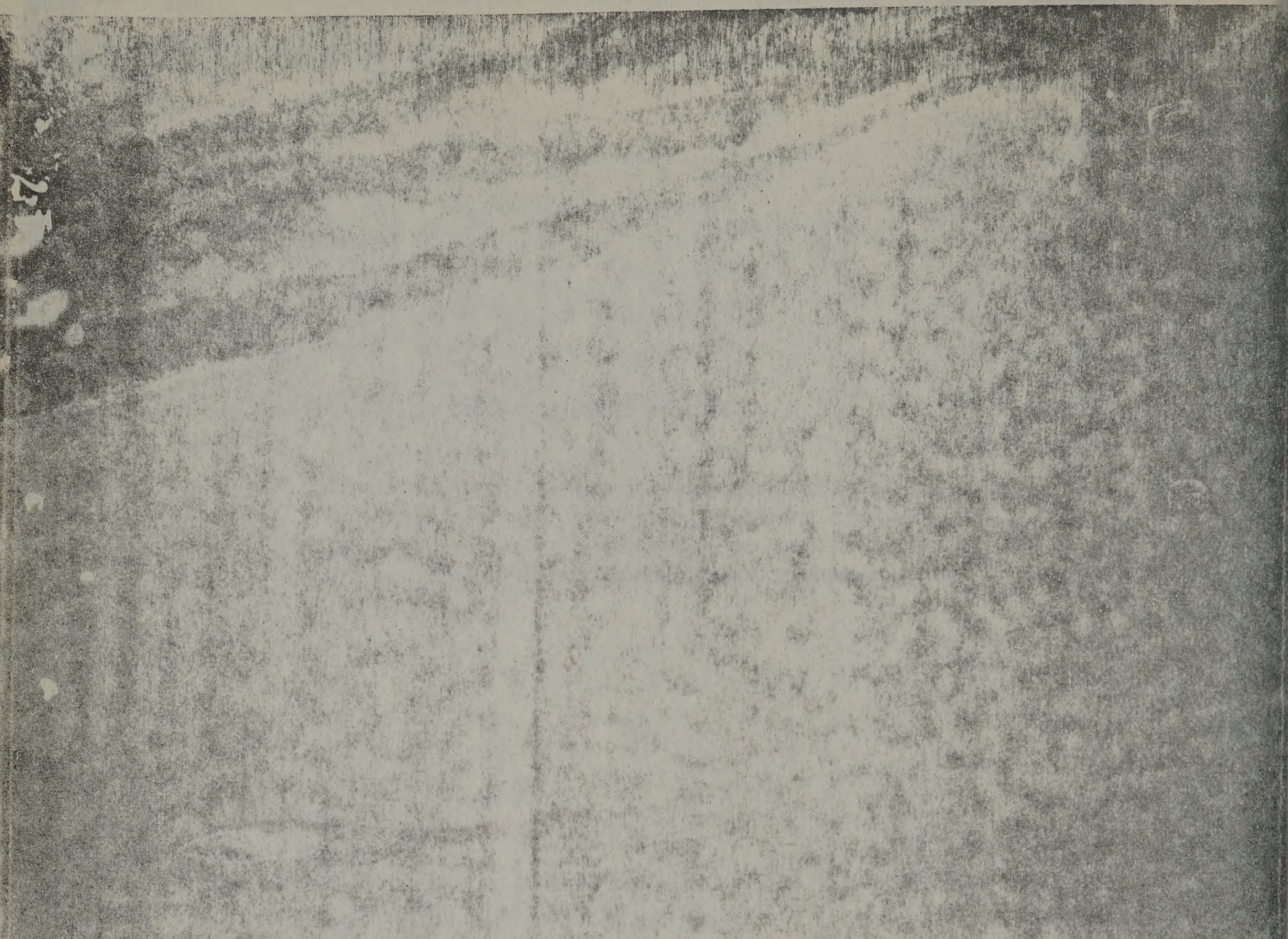
December 9, 1969	Mr. William Ackerknecht, Assistant to Chief, Division of Refuges, Bureau of Sport Fisheries and Wildlife, Washington. Mr. Don Hankla, Division of Refuges, Bureau of Sport Fisheries and Wildlife, Washington. Interviewed in the Washington office of the BSFW.
December 12, 1969	Dr. Stanley A. Cain, former Assistant Secretary of Interior for Fish and Wildlife and Parks. Interviewed by telephone in Ann Arbor, Michigan.
December 15-17, 1969	Mr. Thomas Z. Atkeson, Manager, Wheeler National Wildlife Refuge. Interviewed at the Refuge.
December 16, 1969	Mr. Robert F. Shanks, President, North Alabama Conservation League. Interviewed at Wheeler Refuge.
December 18, 1969	Mr. W. L. Towns, Acting Regional Director, Bureau of Sport Fisheries and Wildlife, Atlanta. Mr. Robert E. Lines, Regional Supervisor of Realty, Bureau of Sport Fisheries and Wildlife, Atlanta. Mr. George Wiseman, Refuge Supervisor, Bureau of Sport Fisheries and Wildlife, Atlanta. Interviewed at the Atlanta Regional Office of the Bureau of Sport Fisheries and Wildlife.
January 2, 1970	Mr. Stewart Udall, former Secretary of Interior. Interviewed at office of _Overview, Inc_., Washington, D. C.

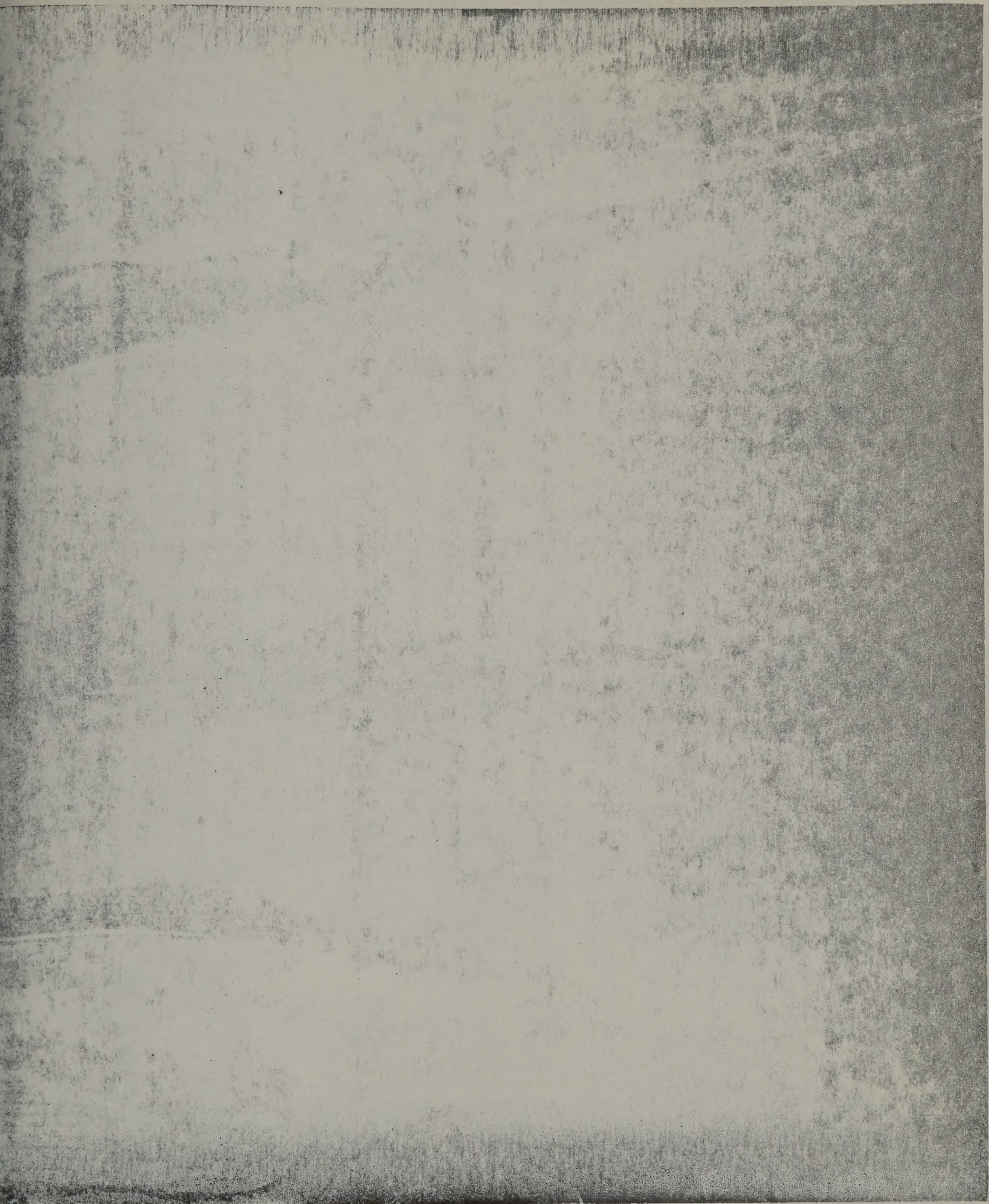
None of these individuals has requested that the interview involved be considered confidential.

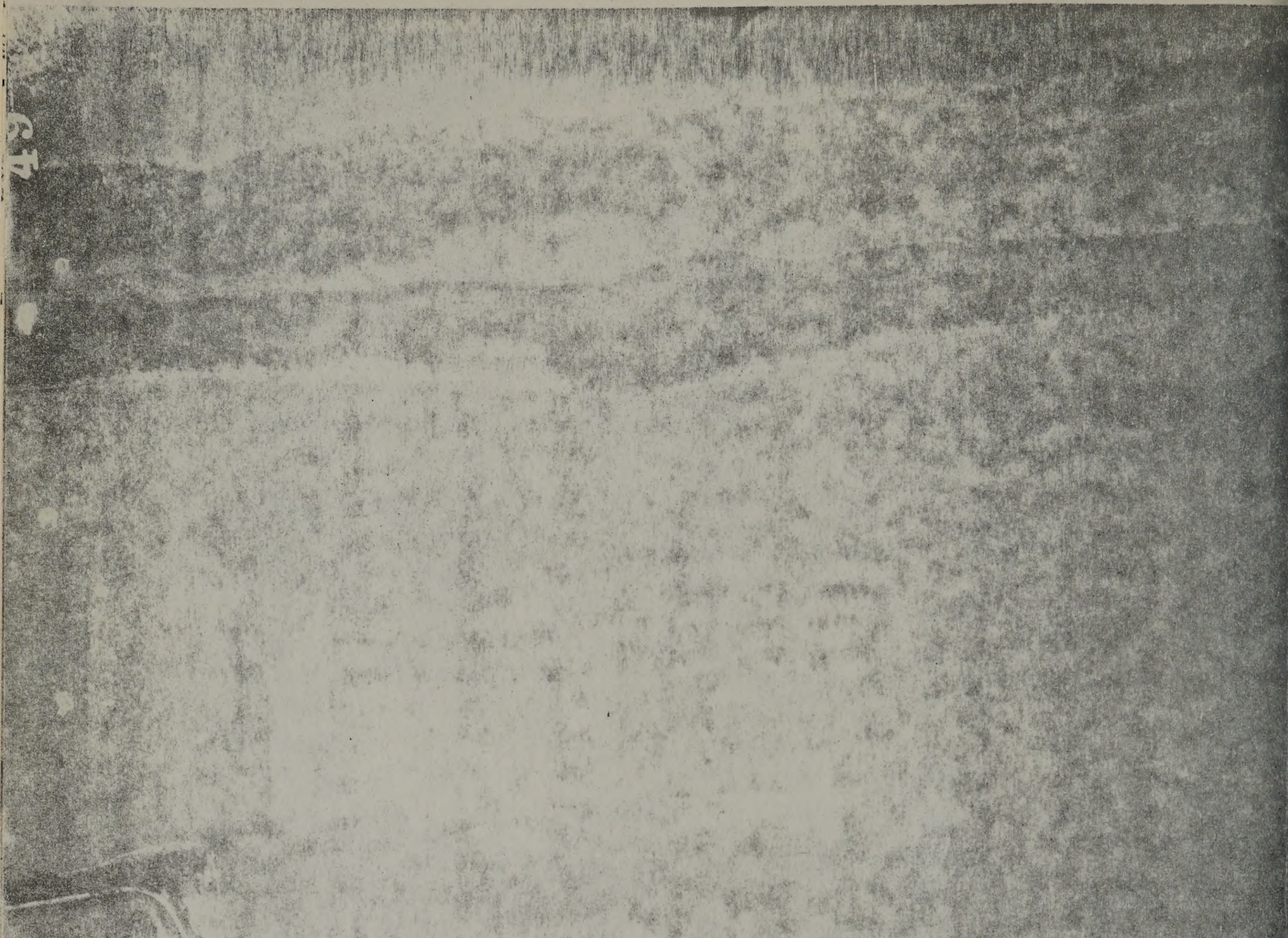
APPENDIX 1

High altitude aerial photograph sequences of the White Springs and Garth Slough areas, showing location of river crossing of I-65. Scale on White Springs series is 1"/250' and on Garth Slough 1"/500'. The White Springs series contains photographs numbered 46-53, the Garth Slough series 53-61.









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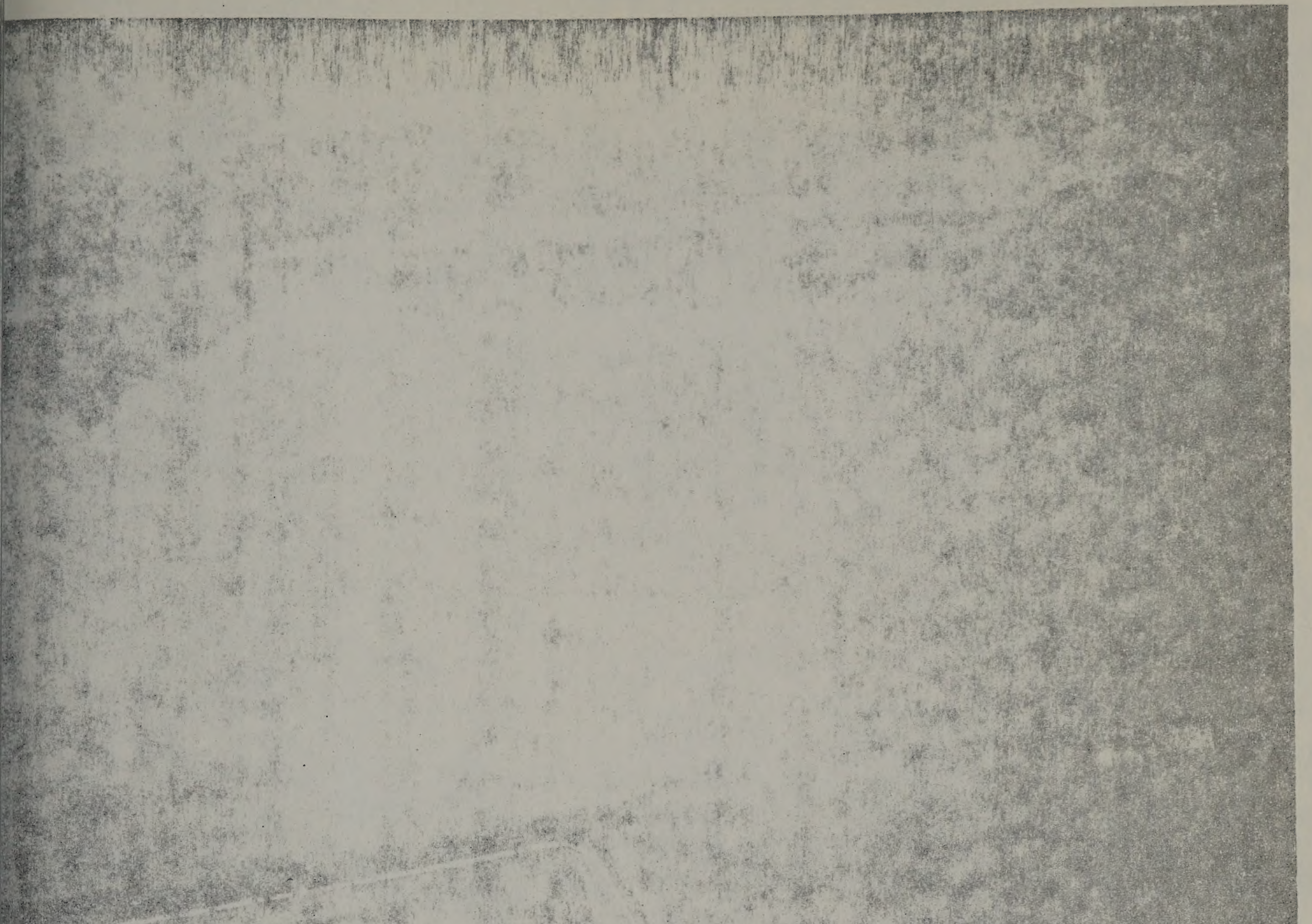

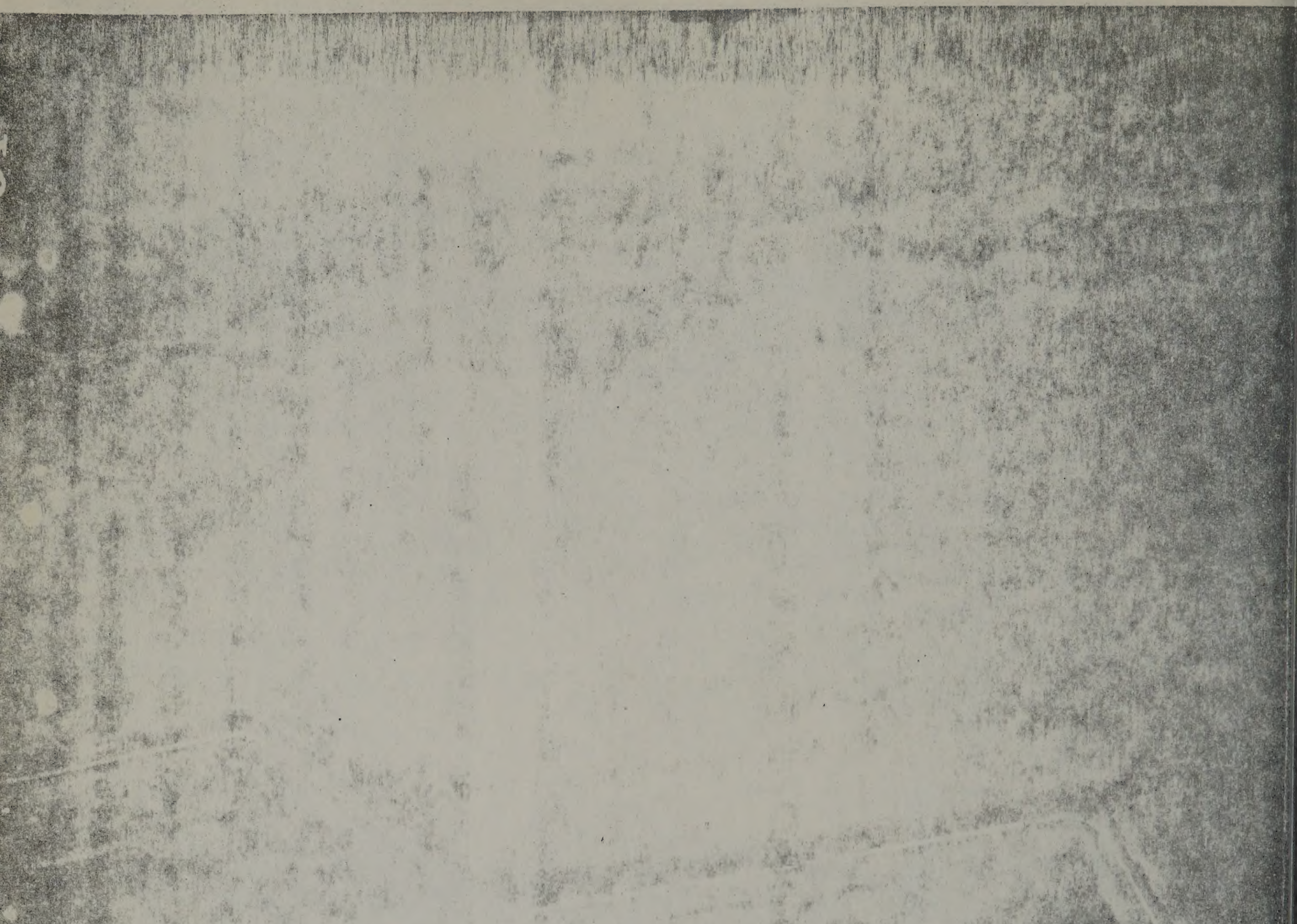

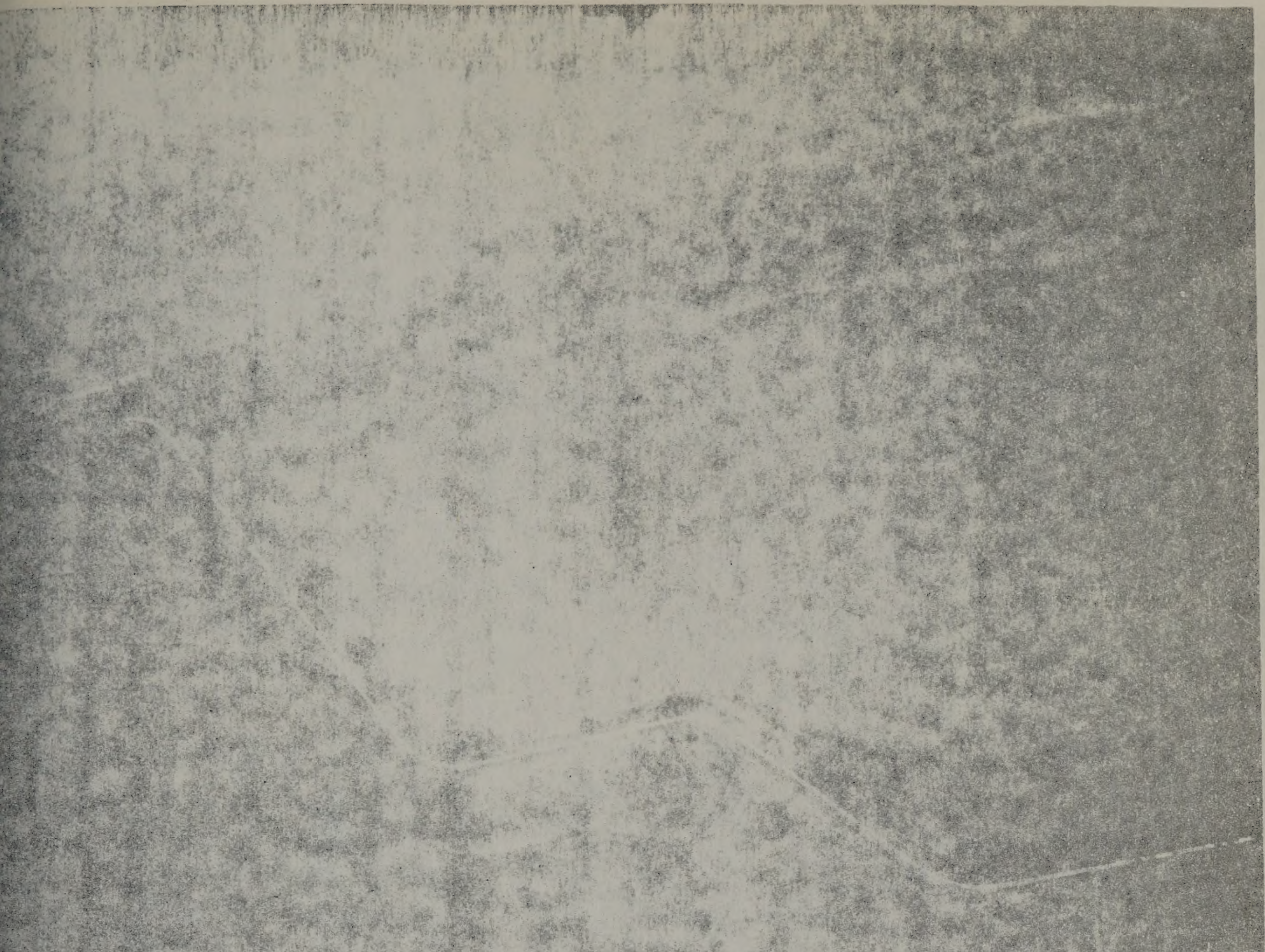

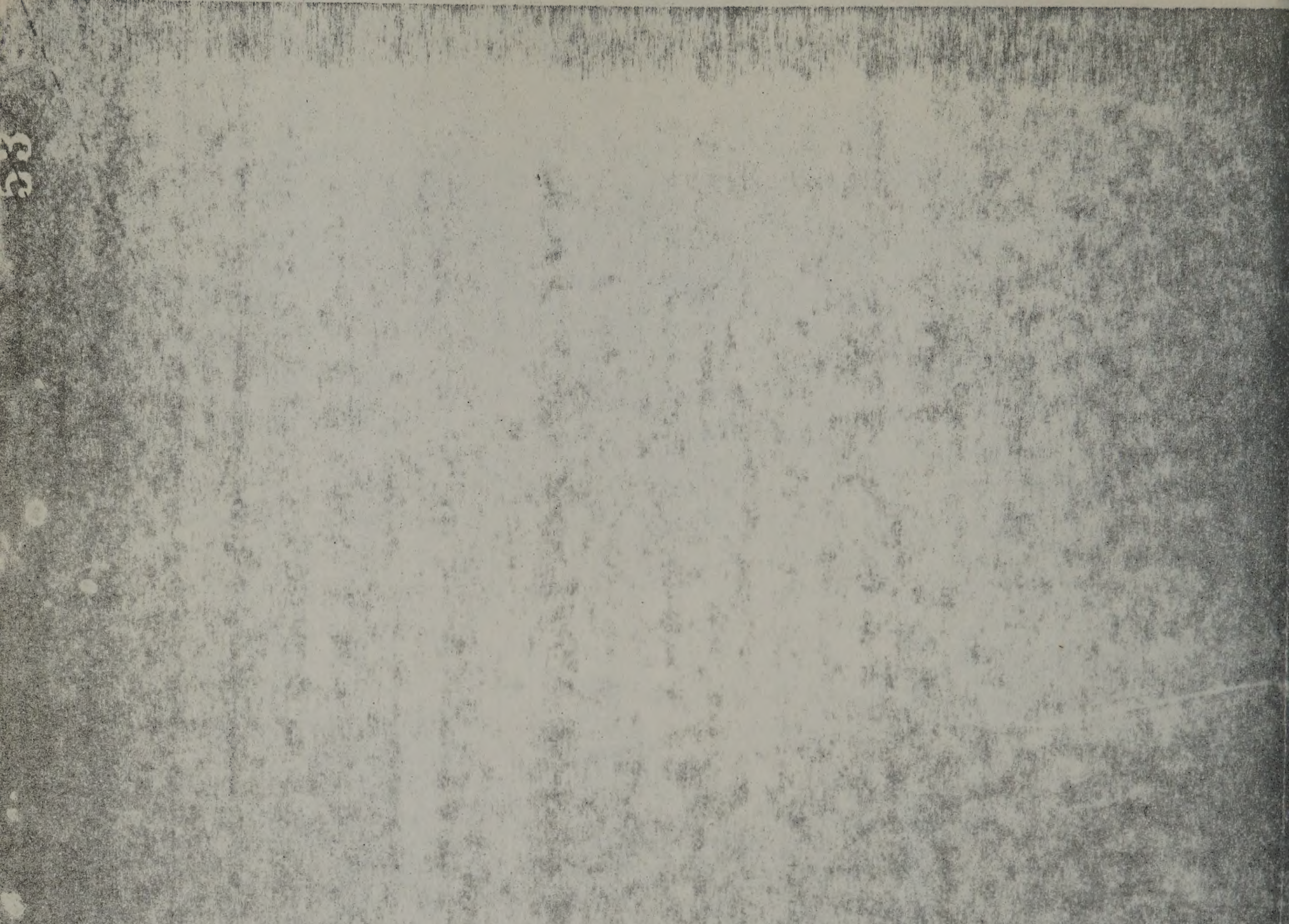
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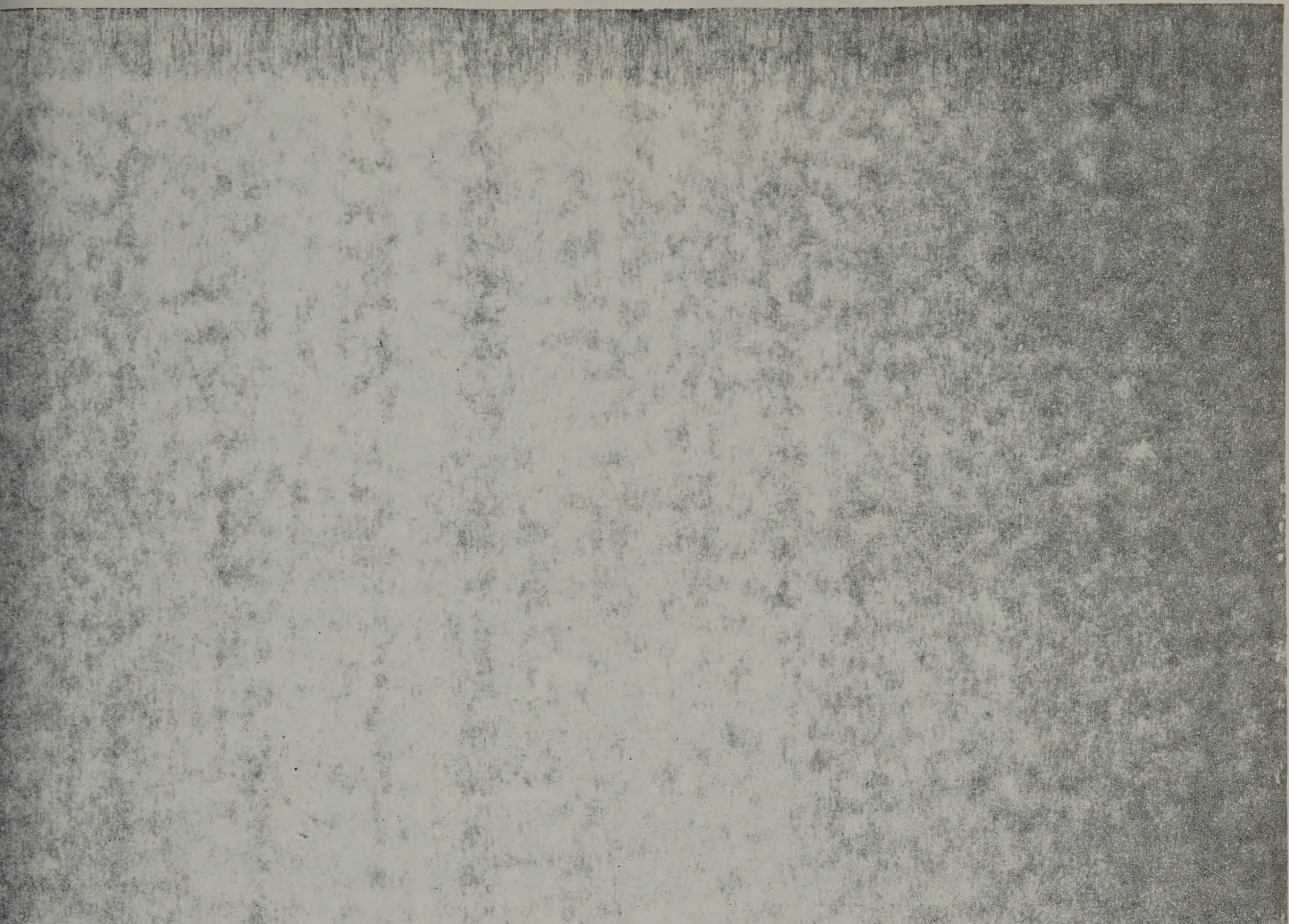

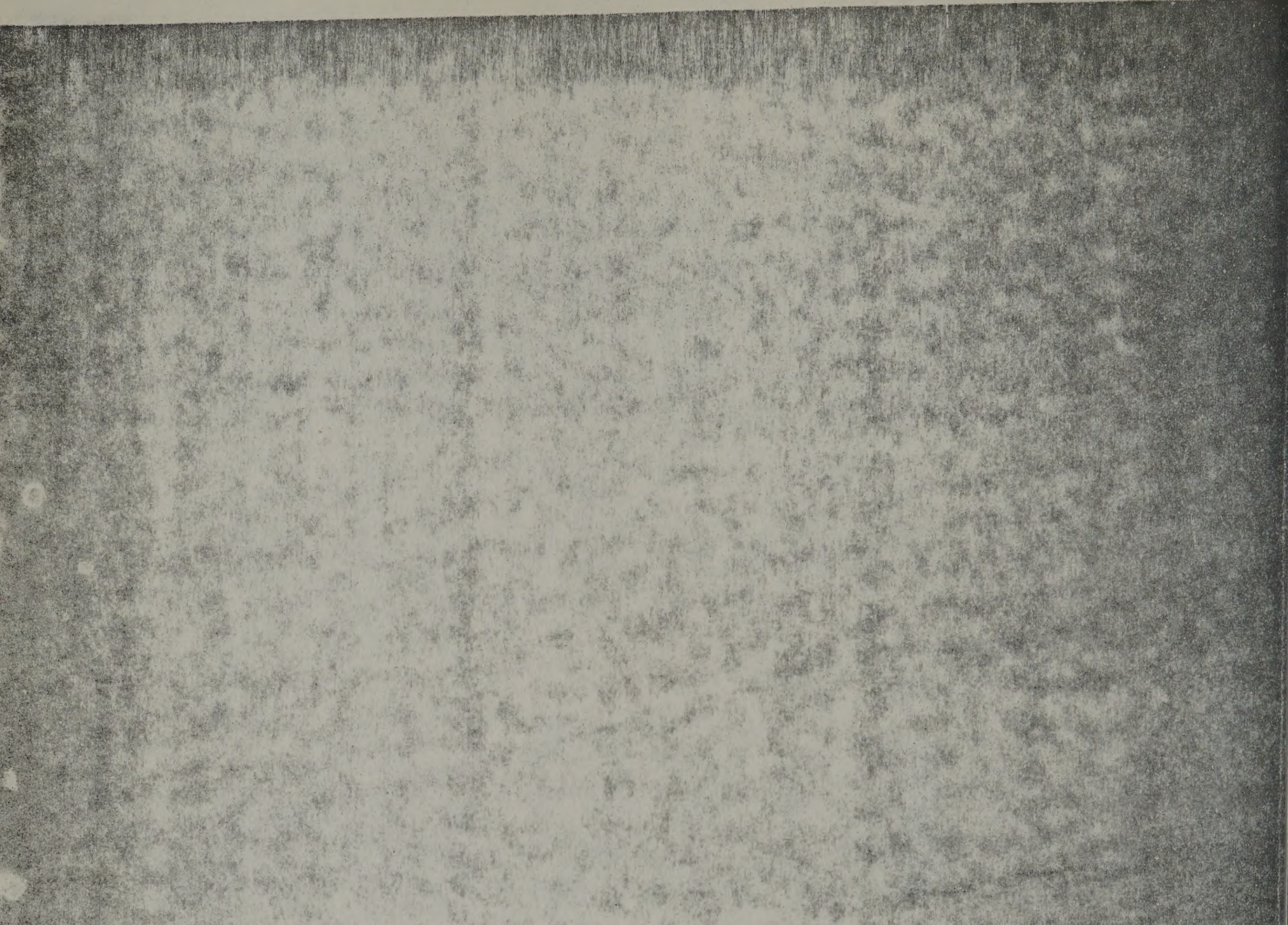

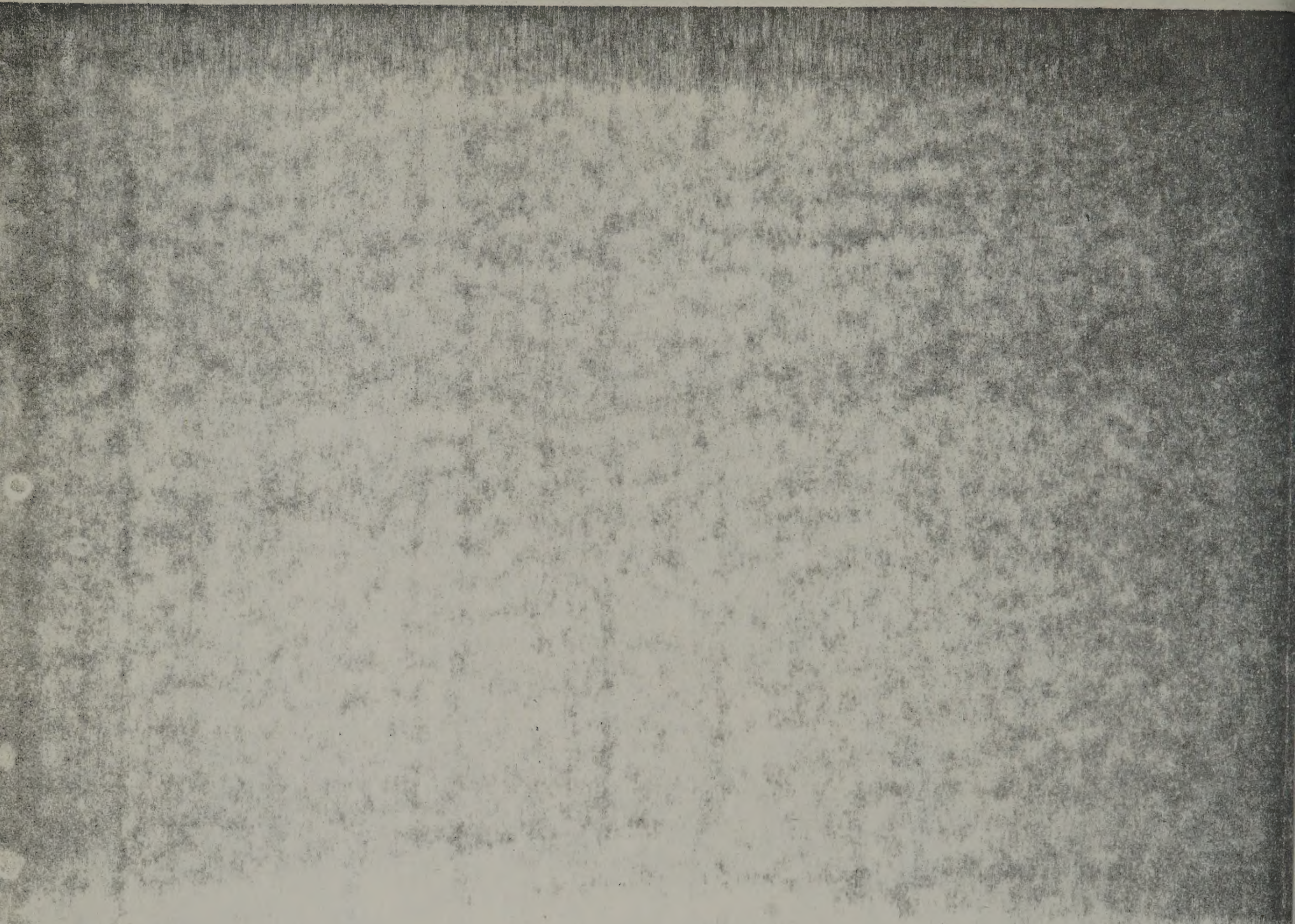

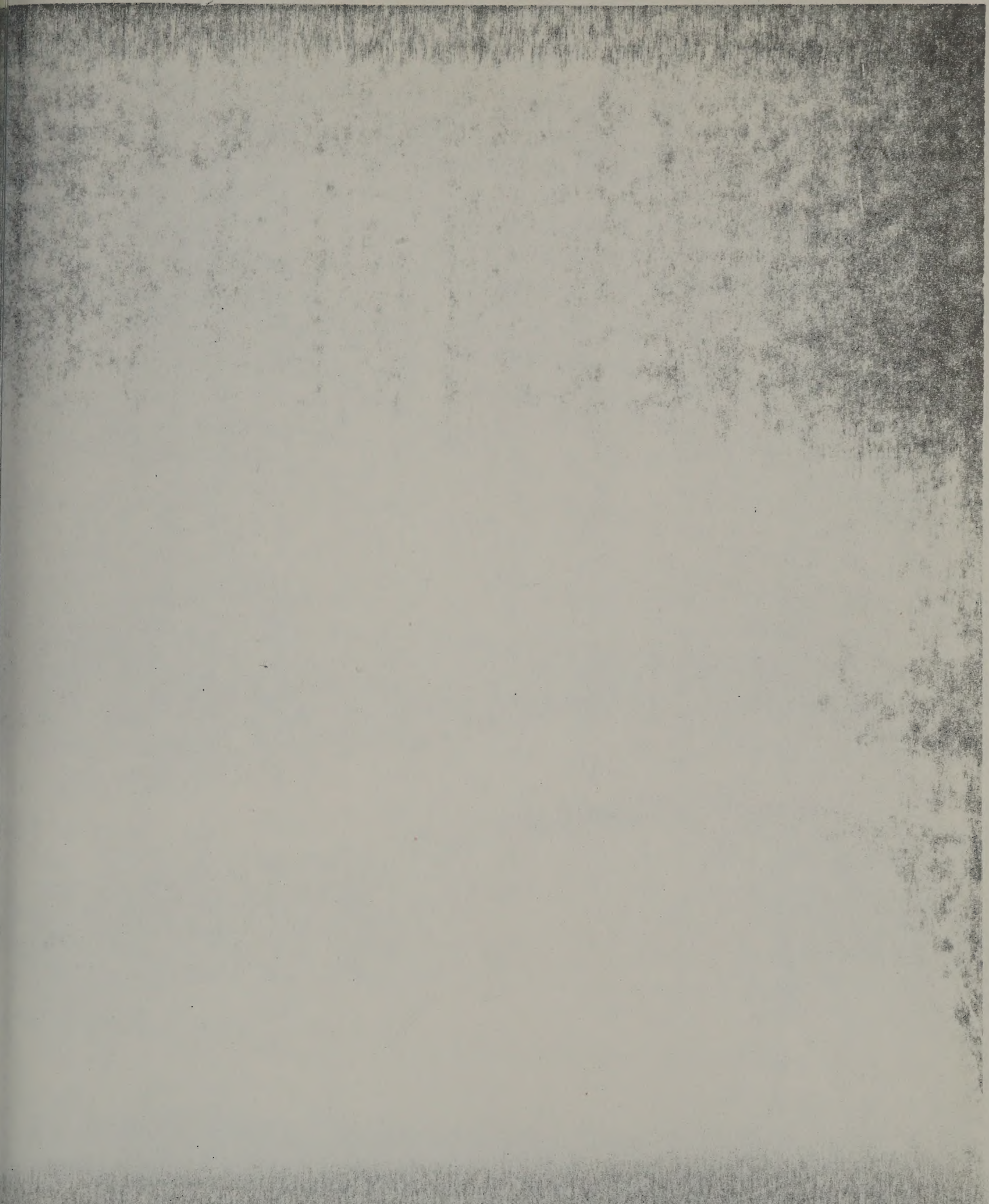

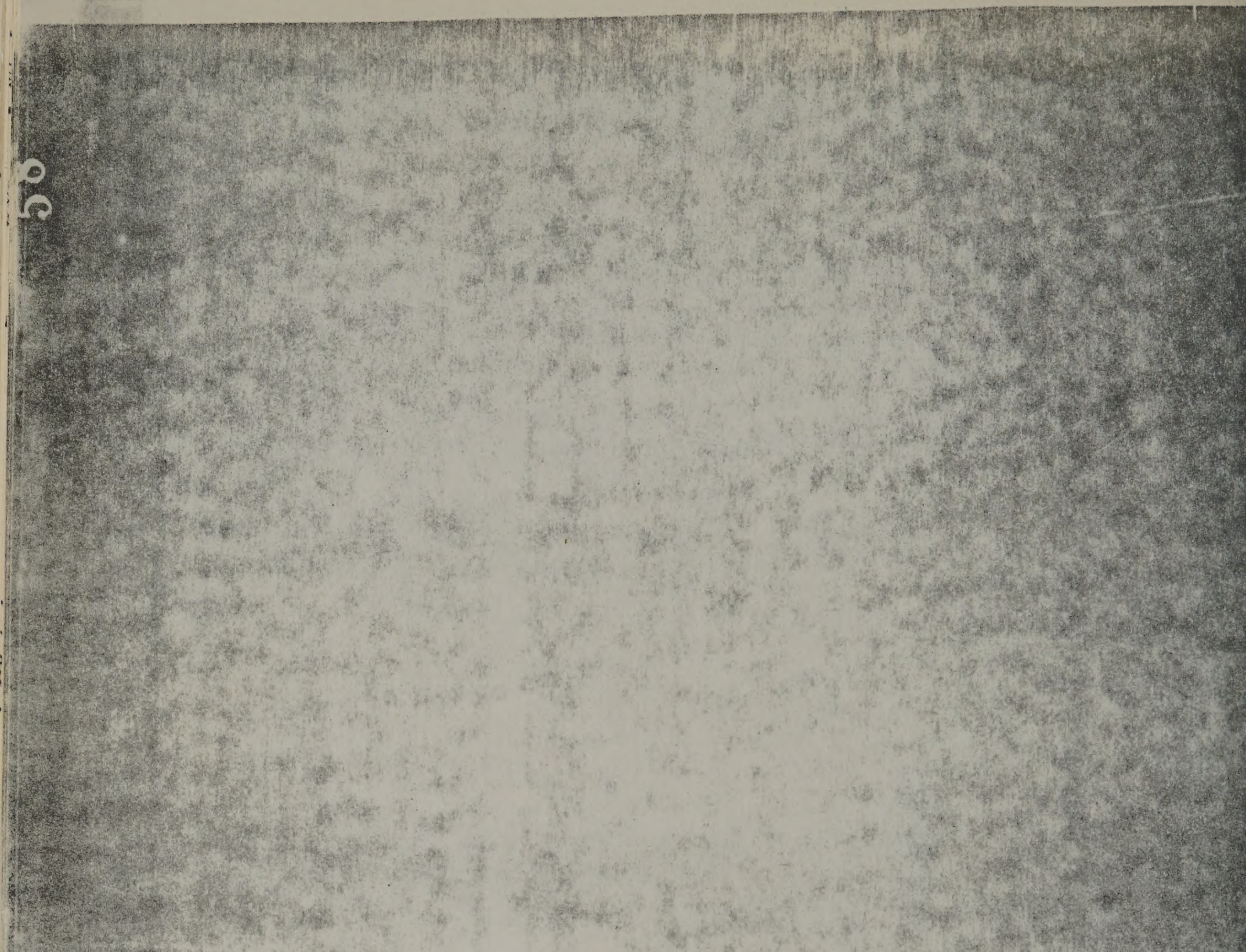
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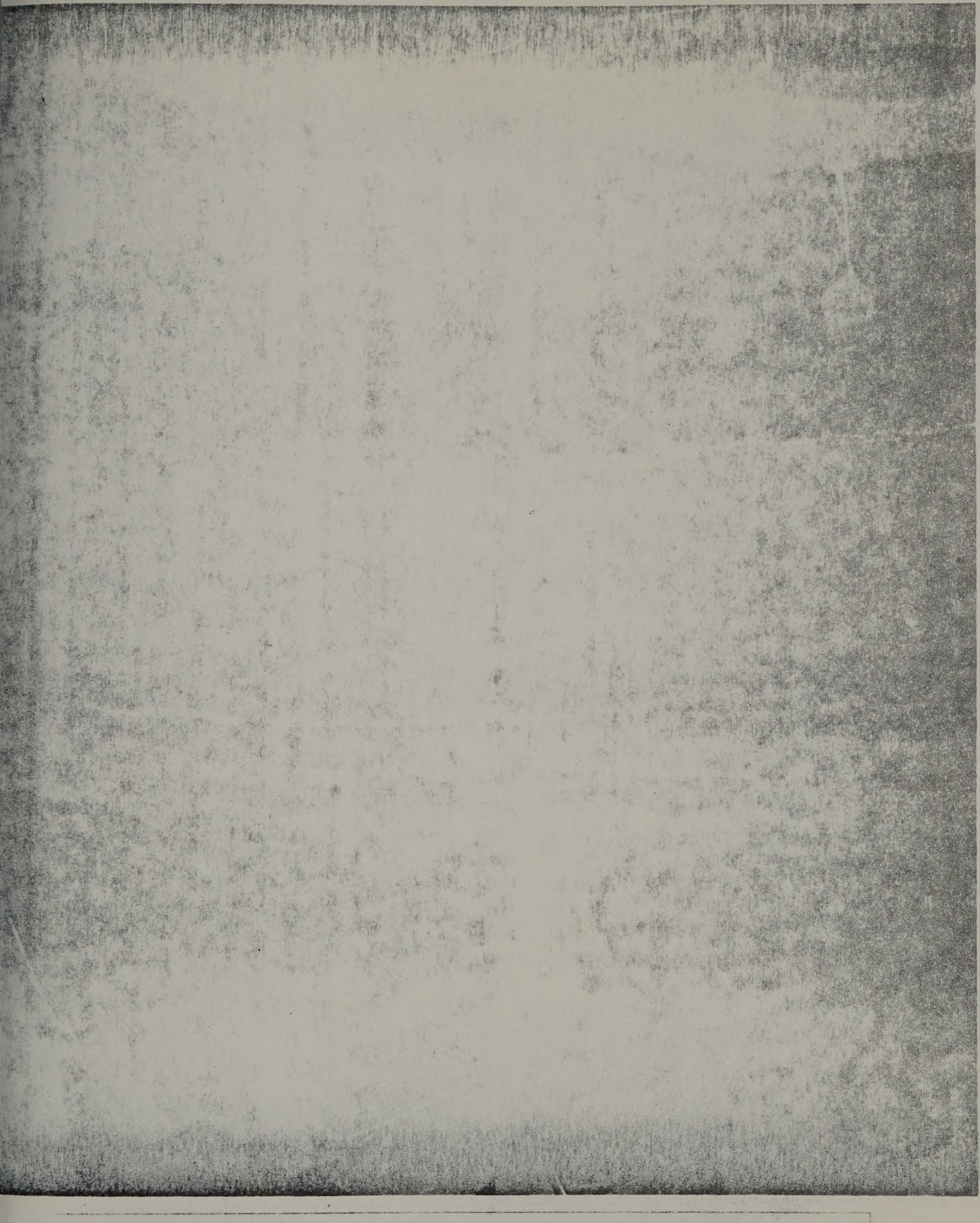
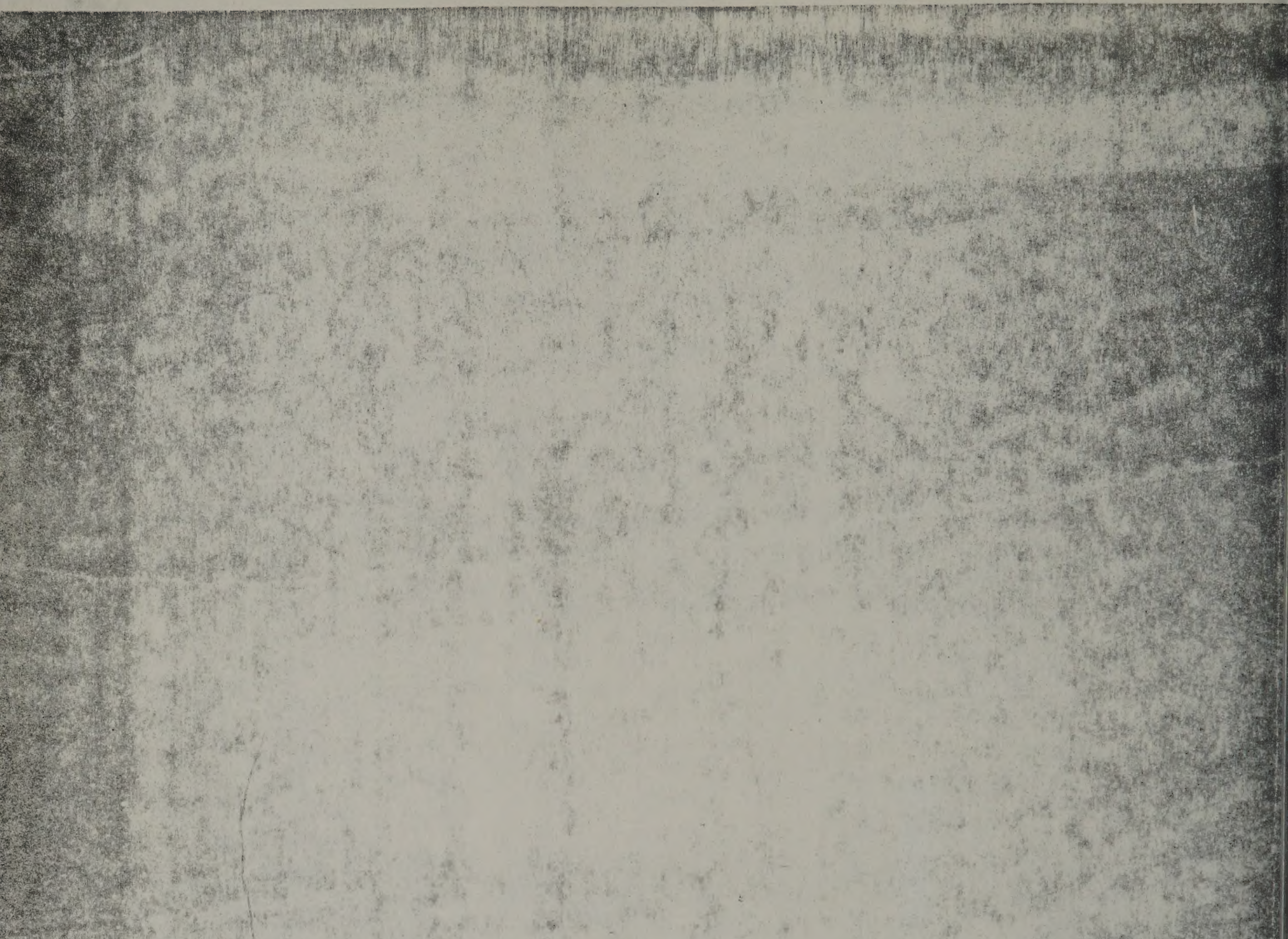
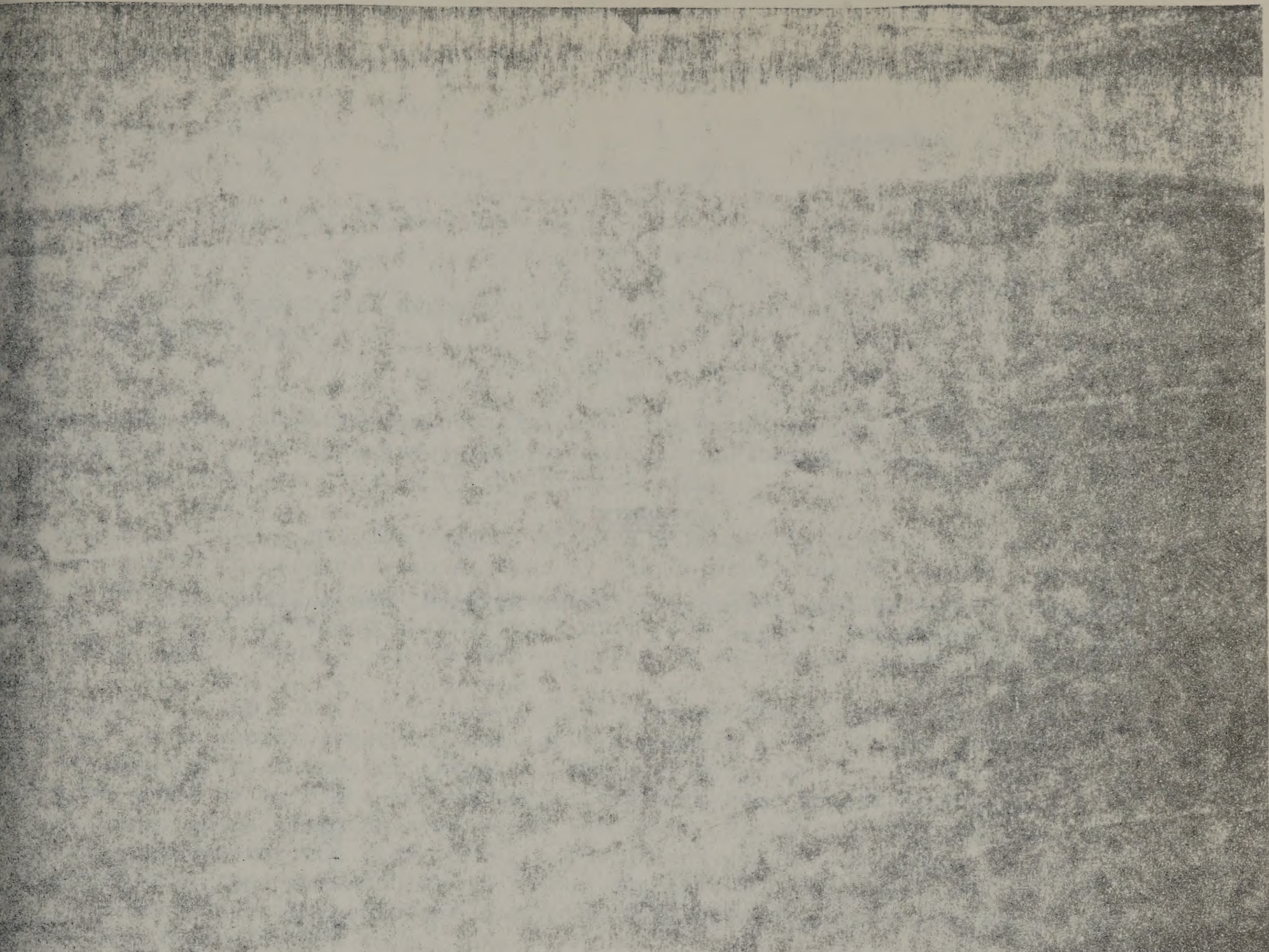






APPENDIX 2

Summary of correspondence involving BSFW, Atlanta, and dealing with the Wheeler Refuge-I-65 case.

Regional Director

September 8, 1965

Regional Supervisor of Realty

LA - Alabama
Wheeler
(R3) State Highway Department I-65-3

Location of Interstate Highway at Wheeler refuge

The following information pertaining to the location of Interstate Highway I-65 is presented in approximate chronological order from the initiation of the project to the present time:

August 3, 1960 - Mr. Joe Teague, Alabama Highway Department, called for permission to proceed with surveys by the Fairchild Aerial Survey Company on Wheeler refuge. Upon telephone inquiry, Refuge Manager Parker reported no advance information on this work until the survey crew arrived at the refuge on the morning of the above date. He refused to allow them entry.

August 3, 1960 - Mr. B. L. Bray, State Highway Department, called the Regional Director regarding the earlier request of Mr. Teague for permission to enter Wheeler refuge to make surveys. He explained that the work would be to place ground control markers for the aerial surveys. Mr. Bray was advised that we would inform Mr. Parker that it would be satisfactory for the crew to begin the ground control marking. It was agreed that the crew would work under the instructions of Mr. Parker for protection of refuge interests and the interests of farmers who had crops on the refuge at the time.

August 4, 1960 - By letter of this date, the Regional Director notified Mr. B.L. Bray, of the Alabama State Highway Department, that they were authorized to enter upon the refuge for the purpose of making the survey requested.

August 9, 1960 - Copy of letter of this date from Mr. A. Reese Harvey, Office Engineer with the State Highway Department, to Mr. H. D. Burnum, Division Engineer of the State Highway Department, at Decatur, notifying him that we had granted permission for the right-of-way location survey. Mr. Harvey pointed out to Mr. Burnum, the Regional Director would like to have prints showing the tentative location of the interstate route.

October 9, 1962 - Letter sent to State of Alabama Highway Department requesting that they furnish map showing the proposed right-of-way. We also asked them to furnish a large-scale map of sufficient size to show I-65 for approximately 20 miles north and south of the Tennessee River.

November 1, 1962 - Letter to Highway Department referring to our previous letters of August 4, 1960 and October 9, 1962, which requested information and tentative location maps. It was pointed out that under existing regulations, the applicant is expected at the earliest possible date prior to filing of an application, to consult with officials of the Bureau having jurisdiction over lands involved.

November 29, 1962 - Letter from Mr. C. A. Bowles, Interstate Engineer with the Alabama State Highway Department, indicating that they had received our letters of October 9 and November 1, 1962, requesting information regarding location of Interstate 65 in the vicinity of Wheeler refuge. He reported that they had not yet determined the location of I-65 in this area since present U.S. 31 is adequate to handle current traffic and that it was more urgent to construct Interstate highways in other portions of the State. He reported that the photography by Fairchild Aerial Survey Company in 1960 was for the purpose of preparing estimates of cost for completion of the interstate system in Alabama, as required by Federal law. Enclosed with Mr. Bowles' letter was a quadrangle sheet showing the general location of the right-of-way. He pointed out that it should not be considered a definite location. At the time, he indicated it would possibly be two years before the State would be in position to begin preliminary hearings in this area and that they would contact the Regional Director prior to beginning location work and promised to maintain contact while this preliminary work was in progress.

January 9, 1963 - Memorandum from Branch of Realty to Branch of Refuges transmitting map showing proposed location of I-65 as furnished by Mr. C. A. Bowles of the Alabama Highway Department, by letter dated November 29, 1962. The Branch of Refuges was asked to indicate on the map the route that they would like to see the road take, so that we could furnish this information to the State and to the Bureau of Public Roads.

March 22, 1963 - Mr. Luke Reynolds, with Tennessee Valley Authority, in Sheffield, Alabama, called the Regional Director on this date and advised that he had talked with Mr. Herman Nelson, the new Division Manager of the State Highway Department, Decatur, Alabama, who is in charge with the Northern Alabama District. Mr. Reynolds gave Mr. Nelson the names and addresses of Mr. Gresh and Mr. Atkeson, and Mr. Nelson indicated he would contact one or the other. Mr. Towns, who received this phone call in the Regional Director's office, told Mr. Reynolds we had an alternate location we would like to submit and would go to Decatur to talk to Mr. Nelson.

March 1, 1963 - Memorandum from Regional Supervisor, Branch of Refuges, to Branch of Realty, transmitting map showing their first and second choices for the crossing of the refuge by I-65.

March 25, 1963 - Letter to Mr. C. A. Bowles, Interstate Engineer, State of Alabama Highway Department, Montgomery, Alabama, transmitting map showing our first and second choices for the crossing of the refuge by I-65. It was pointed out to Mr. Bowles that the general location of I-65 as shown on their map bisected the White Springs Management unit, one of our major waterfowl development areas, and if the road were built in this location, would destroy a large area of agricultural land much needed in our management program. It was also pointed out that a major highway in this location would complicate the problem of moving equipment between the two units that would be left and would result in a waterfowl disturbance problem.

April 30, 1963 - Letter from Mr. W. F. Land, Interstate Engineer, State of Alabama Highway Department to Mr. Walter A Gresh, Regional Director, acknowledging our letter of March 25 regarding our choices for the crossing of the refuge by I-65. Mr. Land said that copies of our letter had been forwarded to Mr. R. E. Norton, Location Engineer, and that a thorough study of the proposed alternates would be made. At the same time, Mr. Land requested a special use permit for the purpose of making trial surveys in this area. He promised to keep us informed as to the study of the proposed alternate routes.

May 3, 1963 - Letter from Regional Director to Mr. W. F. Land, Interstate Engineer, State of Alabama Highway Department, Montgomery, Alabama, acknowledging his letter of April 30. Mr. Land was informed that he would be able to arrange for entry onto the refuge by contacting the refuge manager, who would issue him a special use permit allowing entry for the necessary surveys.

September 19, 1963 - Memorandum from Wheeler refuge manager to Regional Director reporting that on September 17, 1963, a Mr. Henry P. Dumas of the Alabama Highway Department came by the refuge office in regard to a new survey of the proposed I-65 route. Mr. Dumas showed a map of the proposed route and the refuge manager sketched it on a small-scale refuge map. The refuge manager reported that it did not vary much from past surveys. The refuge manager pointed out that the routing of this highway across the strategic western end of the refuge posed a considerable threat to Wheeler's value as a waterfowl wintering area.

September 19, 1963 - This is the date appearing on copy of the letter from Mr. Jack W. Ward, Chief Engineer, State of Alabama Highway Department to Mr. John B. Dalhouse, Division Engineer, Bureau of Public Roads, Montgomery, Alabama, transmitting a copy of Alabama Department of Conservation's letter dated September 12, 1963, with map regarding the location of proposed Interstate Highway No. 10 across the Mobile Bay area. Mr. Ward assured Mr. Dalhouse that the Alabama Highway Department would comply with the Bureau of Public Roads Instructional Memorandum 25-5-63, and cooperate and coordinate with all the conservation interests involved in not only the Mobile Bay crossing, but also in the Decatur crossing in the Wheeler National Wildlife Refuge.

January 16, 1964 - Memorandum from Wheeler refuge manager to Regional Director informing us that the final survey for Interstate Highway 65 was in progress and that actual construction across the refuge may start within a year. He also pointed out it could be delayed as much as three years. He reported that the final routing would be slightly further east than we originally thought and would cross the eastern end of the White Springs dewatered unit and the western end of Garth Slough. The refuge manager pointed out that this would probably be the time to start negotiations with the Highway Department concerning underpasses or other methods of crossing the highway, since there are only two designated interchanges, or crossings, in the area.

February 25, 1964 - Memorandum from Wheeler refuge manager to the Regional Director reporting that he had been contacted by a Mr. E. P. Garrett, of Belle Mina, Alabama, acting as spokesman for a group of Limestone County landowners dissatisfied with the proposed route of I-65. Mr. Garrett and his group are trying to have the highway routed further to the east and had been told that the present survey line was not necessarily a final one.

The City of Huntsville is bringing pressure on the Highway Department to route the road nearer the planned new airport along the Madison-Limestone County line, with consideration given to crossing the river near Rockhouse Landing or near Bluff City, and that final routing would depend, to some degree, on the preferences of our Bureau. The manager pointed out that any river crossing from Rockhouse Landing eastward would be preferable to the present planned crossing.

August 13, 1964 - Letter from Mr. L. T. Pepper, Chief of Party, State of Alabama Highway Department, to Mr. Thomas Z. Atkeson, refuge manager at Wheeler National Wildlife Refuge, regarding the extension of a special use permit granted to the State of Alabama Highway Department for the purpose of conducting a preliminary survey for I-65. Mr. Pepper wanted the permit extended to December 31, 1964.

August 20, 1964 - Letter from Regional Director to Mr. R. E. Norton, State Highway Department, on their request for an extension of survey permit. Mr. Norton was informed that we understood the extension would be for the purpose of locating the final route of I-65. He was told that before such permission could be issued, it would be necessary to meet in Atlanta to discuss the situation.

August 25, 1964 - Letter from Mr. R. E. Norton to Regional Director requesting such a meeting. Mr. Norton stated that, contrary to current rumors, the line being run on the ground at present is not considered to be the final location. They had not completed studies, including our proposal of alternate route locations, and also a public hearing had not yet been held. He said that they fully intended to meet with the Bureau and further discuss the matter.

August 31, 1964 - Letter from Regional Director to Mr. H. L. Nelson, State Highway Director, Alabama Highway Department, acknowledging Mr. Norton's letter of August 25 and informing them that we were glad to see that the final location of I-65 had not been resolved. He was informed that the Bureau would be happy to discuss the matter further with the State Highway Department as soon as complete information is available.

September 21, 1964 - Telephone call from Messrs. Land and Crawford, of the Alabama Highway Department, to the Regional Director, regarding location of Interstate Highway 65. They reported that the Highway Department had assembled information on the alternate routes, as requested by us, and they would like to arrange a meeting with us to go over this material. A meeting was set for 10 a.m., September 29, in the office of the Regional Director in Atlanta.

October 2, 1964 - Letter from W. F. Land, Interstate Engineer, to Mr. W. L. Towns, Acting Regional Director, transmitting aerial photographs showing area along I-65 (as now projected).

October 6, 1964 - Memorandum from Regional Supervisor of Realty to the files, pertaining to meeting of September 29, 1964, between the Bureau, Alabama State Highway Department, and the Bureau of Public Roads. Mr. Ralph H. Allen, Jr., of the Alabama Department of Conservation also attended the meeting.

October 27, 1964 - Mr. W. F. Land, of the Alabama Highway Department, called Mr. Towns to inquire about a meeting to be held at Wheeler refuge regarding the proposed I-65. Mr. Land was informed that we were preparing an impact report covering the effect of the highway at the various proposed locations on the refuge and that we hoped to have it completed shortly. We told him we plan to contact the Highway Department within two weeks. Mr. Land explained that their survey party, which was idle now, was costing $5,000 per month and they would like to handle this matter as quickly as possible.

December 18, 1964 - Letter to Mr. C. A. Bowles, Interstate Engineer, State of Alabama Highway Department, from Acting Regional Director on the effects of the proposed alignment of I-65 and alternates Nos. 1 and 2, as suggested by the Bureau. In this letter, comparisons were made between the proposed right-of-way and alternates Nos. 1 and 2, with the recommendation that alternate route No. 1 be used. It was pointed out that this involves a national responsibility and that perhaps it might require resolvement at a national level. Mr. Bowles was informed that if he were unable to accept our recommendations, the matter should be reviewed at a higher level by the Bureau of Public Roads and this Bureau.

December 22, 1964 - Telephone call from Mr. Spoden of the Division of Realty in Washington to Mr. Lines, Regional Supervisor, Branch of Realty in Atlanta, inquiring about highway right-of-way over Wheeler. Congressman Jones, of Alabama, had just called his office and wanted certain information regarding the matter.

January 4, 1965 - Telephone call from Mr. F. C. Gillette, Chief, Division of Wildlife Refuges in the Washington office, to Mr. Milstead, in the office of Congressman Robert E. Jones in Washington, regarding the proposed interstate road across Wheeler National Wildlife Refuge. Mr. Milstead reported that Congressman Jones had been in Alabama and talked with the State Highway officials, and was "real-shook-up" over our alternate proposal, saying that he wouldn't let any ducks stand in the way of the road. The alternate proposal was definitely not acceptable and the Congressman was ready to go to Secretary Udall, if necessary. Mr. Milstead stated that he had a letter dated December 29, 1964, from Mr. H. L. Nelson, Highway Director, Alabama Highway Department, in which he definitely turned down the proposal and stated he sent letters to that effect to both the Bureau of Public Roads and the Bureau of Sport Fisheries and Wildlife.

January 4, 1965 - Telephone call from Mr. Buell regarding our report on relocation of the highway on Wheeler refuge and asking if we would be able to hold up under pressure on the second alternative; also, whether we could expect local support for our proposal. Mr. Findlay told him that we would get very little local support and that we would need assistance from the Bureau of Public Roads. It was pointed out the second alternative would not divide as much of our property as would the Highway Department's first proposal.

January 5, 1965 - Letter from W. L. Towns, Acting Regional Director, to Mr. H.L. Nelson, Highway Director, Alabama Highway Department, acknowledging receipt of his letter dated December 29 regarding the routing of I-65 through the Wheeler Refuge. Mr. Nelson's letter of this date pointed out that our alternate routes were not justifiable and the State Highway Department could not accept them. In the above-referred-to letter, Mr. Nelson advised that he had informed the Bureau of Public Roads that he could not accept our alternates and was suggesting a meeting between the Bureau of Public Roads and the Bureau of Sport Fisheries and Wildlife.

January 13, 1965 - Memorandum from Regional Director, Atlanta, to Director, Washington, D. C., regarding proposed meeting of the Regional Director, BSF&W, with the Regional Director, Bureau of Public Roads, regarding the location of I-65 through Wheeler Refuge. The BPR people did not indicate what their recommendation would be to higher authority, but it was evident that they will not attempt to resolve the alignment question at regional level. It was pointed out that the Alabama Highway Department was seeking Congressional support for their proposed alignment and it was suggested that the Washington office immediately contact the BPR in Washington.

February 12, 1965 - Telephone call from W. L. Towns to Division of Refuges, Washington. Mr. Ackerknecht was informed that we had been talking to the BPR and learned that they had received from the State Highway Department some information on I-65 crossing and that they were making an amended location in alternate No. 1 by straightening out north of the river. This would reduce additional mileage to 2½ miles and would cut additional cost some $400,000, also would reduce user charges about $600,000 per year; that it did not affect Wheeler Refuge alignment on highway. Mr. Towns advised that copies of figures and amended alternate No. 1 would be sent to Washington that day and that Mr. Rex Anderson, Regional Engineer, BPR, is carrying reports to Washington this week and they will probably want to meet with our Washington office the following week. Mr. Ackerknecht said he would pass this information on to the Congressman's office.

February 12, 1965 - Memorandum from Mr. W. L. Towns, Acting Regional Director, Atlanta, to Director, BSF&W, Washington, D. C. referring to conversation by telephone the same morning between Mr. Ackerknecht, Mr. Givens and Mr. Towns. After the phone call, Mr. Towns spoke with Mr. Harry Starke in the BPR and obtained some additional information, advising that the State Road Department and the BPR have reconsidered the alternate route which we recommended and a modification of this route. The modified route would increase the length of the construction less than alternate No. 1 and would also substantially reduce any increase in road user costs; even with these reductions, the increase in cost is substantial and Mr. Starke advised that their office here could not recommend the alternate alignment. A copy of the report on the modified alternate alignment, which was prepared by the State Road Department in cooperation with the BPR, was furnished to Washington.

March 2, 1965 - Mr. Atkeson called to make a report on his contacts regarding location of this road. He said people in Decatur were very happy about the proposed route and he considered it best not to make any contacts in Decatur. His contacts at Huntsville indicated that people there wanted to see the road come closer to Huntsville.

March 5, 1965 - Telegram from W. L. Towns to Director, BSF&W, Washington, D. C., confirming Spencer Smith's discussion of I-65 crossing the Wheeler Refuge with Mr. McBroom. It was pointed out that it would be fruitless for the Alabama Highway Department to hold a public hearing covering alignment in the refuge prior to resolvement of this matter. We recommended that Secretarial clearance be obtained for preparing a hearing statement indicating that the Bureau would not grant right-of-way for proposed Highway Department alignment but would, as an alternate, grant right-of-way along the Bureau's proposed alignment.

March 12, 1965 - Copy of letter from Senator Metcalf to Mr. Rex Whitton, Federal Highway Administrator, regarding routing of I-65 where it would cross Wheeler National Wildlife Refuge. Senator Metcalf was informed that the Department normally resists when some State Highway Department tries to build roads through the middle of a national wildlife refuge. The Senator wanted to be kept up to date and asked that someone prepare a brief report for him and that he be notified of any new developments.

May 7, 1965 - Memorandum from Director, BSF&W, to Secretary of the Interior through the Assistant Secretary for Fish and Wildlife, regarding the proposed route of I-65 through Wheeler Refuge. This memorandum was furnished in answer to Mr. Beaty's memorandum of May 3 requesting that the Bureau prepare a brief report concerning the Alabama State Highway Department's proposed routing of I-65 through Wheeler Refuge. The success of this refuge and its importance to the national wildlife refuge system were pointed out to the Secretary.

May 7, 1965 - Memorandum from Mr. Walter Pozen, Assistant to the Secretary, to Dr. Cain of the U.S. Fish and Wildlife Service. Mr. Pozen reported that the Secretary would like to get involved in the Wheeler Refuge problem, and indicated that the Secretary would like a letter to Secretary

Connor for his signature, with copies to Bill Moyers, Kermit Gordon, and Dick Goodwin stating that an alternate route is available which would prevent desecration of the wildlife refuge. It was also suggested that the letter should point out that the alternative would require the building of two miles of additional roads at a cost of about $2 million, but, that there should be an explicit judgment, a weighing of values--in line with the President's Natural Beauty Message.

June 5, 1965 - Letter from Secretary of the Interior to Secretary of Commerce pertaining to the location of I-65 as it crosses Wheeler National Wildlife Refuge. The Secretary of the Interior indicated that he was taking a strong stand in opposition to the shortest route and was supporting the BSF&W in its suggested alternate route. He asked the Secretary of Commerce to persuade the BPR to consent to the route as recommended by the BSF&W.

July 14, 1965 - Copy of letter from H. L. Nelson, Highway Director, State of Alabama Highway Department to Mr. Daniel A. Poole, Editor, OUTDOOR NEWS BULLETIN, Washington, D. C. Mr. Nelson indicated that as far as he knew, the Alabama Department of Conservation had made no recommendation for the longer, more costly Interstate 65 route at Wheeler National Wildlife Refuge. He asked that he be furnished a copy of any such recommendation that might have been made by the Alabama Department of Conservation on this matter.

July 20, 1965 - Memorandum from Chief, Division of Wildlife Refuges, to the files, regarding telephone conversation with Mr. Givens, with emphasis on location of I-65 at Wheeler Refuge. Mr. Gillette discussed the possibility of acquiring replacement lands at Wheeler to mitigate damage by the proposed Interstate Highway. As a possible replacement area, Mr. Givens indicated offhand that the proposal to extend the refuge to Highway 20, which would include Section 12 just north of the White Springs dewatering area, would probably serve admirably as a replacement and permit the proper management of the geese. Mr. Givens pointed out that the land would probably be extremely expensive and might cost as much as $1,000 an acre. Mr. Givens was asked to make a study of the entire area and determine what lands would be acceptable for replacement purposes, then submit his recommendations as soon as possible. He was also asked to give examples of highway development on refuges that had some measurable effect on ducks or geese.

July 20, 1965 - Memorandum to Regional Director, Atlanta, from Director, reporting a meeting held with Mr. Whitten, Director, BPR, on July 20 to discuss the road through the refuge. Mr. Whitten appreciated the position taken by the BSF&W but was concerned over the additional distance required by the alternate location. Mr. Whitten suggested that possibly some additional area could be acquired by the BPR to add to the refuge to replace some of the area lost because of the highway location. They also wanted to know of specific instances where waterfowl populations had been adversely affected by similar road construction.

July 30, 1965 - A restricted memorandum from Regional Director, Atlanta, to Director, regarding the alignment of I-65 in the Wheeler Refuge. The Regional Director expressed his concern over the negotiations for replacement of losses which would result from the State's proposed alignment. He points out that it appears the BPR's position with regard to road user savings in the Refuge area is distorted and is not in line with basic philosophy on the interstate purpose and needs. He also points out that the precedent which will be established by the Wheeler decision is undoubtedly being watched by the State and the BPR and any success in our obtaining a favorable decision here would be a deterrent to other possible refuge crossings in the future.

Robert E. Lines

HRWilliams:RELines:mrm:eh

STAY ALIVE IN '65

UNITED STATES GOVERNMENT

MEMORANDUM

Date: December 18, 1969

To: The File

From: Regional Supervisor of Realty

Subject: Sequence of actions (continued from memorandum of September 8, 1965)

LA - Alabama
Wheeler
(R3) State Highway
Department I-65

September 16, 1965 - The Bureau Director wrote Federal Highway Administrator Rex Whitton reiterating the refusal to grant right-of-way other than along alternate location No. 1. It was stated that TVA concurred with the Bureau position.

January, 1966 - TVA initiates study of engineering features of proposed road as they will affect reservoir operations. On January 24, 1966, we reminded TVA that no location has yet been approved.

* February 3, 1966 - Meeting held in Washington between Secretary Udall, Federal Highway Administrator Rex Whitton, and Bureau personnel. At this time, Secretary Udall suggested that if road crosses refuge at proposed location, construction should be on piers across the bottoms. Also, we would require that no work be conducted during the waterfowl use period of approximately four months. The Department agreed to restudy its position.

February 7, 1966 - TVA advised State that preliminary engineering plans acceptable but no comments would be furnished until Bureau agrees to route.

February 8, 1966 - BPR, Atlanta, wrote their Washington office recommending approval of original location with viaduct construction and no work to be accomplished during waterfowl season.

* February 10, 1966 - Secretary Udall and Bureau representatives again met with Rex Whitton. No decision was reached but Interior Department agreed to again study original location with viaduct construction.

2/25/66 - Region wrote lengthy report to Central Office of Bureau, stating that in opinion of Region acquisition of land for mitigation not practical in the Wheeler refuge area and that if trestle construction used, elevation should be as low as possible. We also suggested that special speed limits through the refuge would be of doubtful value, that a non-work period during the waterfowl season is desirable, and that the future of Wheeler refuge is definitely not bright as a result of continual encroachments.

* Apparently only a single meeting held on Jan. 28, 1966 - the confusing references here resulting from memos being prepared on meeting content at later dates. GWC

March 4, 1966 - State filed with BPR formal request for right-of-way in the original location. Application went also to TVA.

March 31, 1966 - BPR forwarded application to our Bureau with a request for approval.

April 15, 1966 - Central Office in a memorandum to the Region gives first indication the Secretary will likely approve the right-of-way permit in original location.

May 4, 1966 - In a letter to Federal Highway Administrator Whitton, Secretary Udall withdraws Departmental objections to the proposed right-of-way, provided that there be no construction during the waterfowl season, that approaches on both sides of the river can be designed in a fashion acceptable to the Bureau, and that details of a formal permit can be worked out between the agencies.

From this time until the permit finally issued, there was substantial correspondence and several meetings between the State, TVA, and the Bureau on details of construction and conditions of proposed permit.

August 24, 1967 - Region report to BLM recommending conditions for right-of-way grant.

October 17, 1967 - Advance permission for construction granted to State. Stipulations forwarded for acceptance at same time.

November 6, 1967 - Right-of-way granted by BLM.

Robert E. Lines

KEEP SAFETY ALIVE

CASE STUDY NO. XIII

MIDDLE SNAKE RIVER PROJECTS, IDAHO

by

KENNETH HUNGERFORD

Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

RECITATION OF THE FACTS

a. Introduction

The Snake River originates in and near Yellowstone and Grand Teton National Parks near the Idaho-Wyoming border. As it crosses southern Idaho, the river is used extensively for power, irrigation, recreation, industrial and domestic purposes. Where the river enters mountainous country forming the boundary between Idaho and Oregon, three dams have been built by the Idaho Power Company. The river gorge between these developments and Lewiston, the main Hell's Canyon, is the deepest river gorge in North America. The impact of proposed dams on this portion of the Snake River is the subject of this report.

(1) Columbia River Development

Development of the Snake River has long been considered part of the regional picture, including the Columbia Basin as a whole. Before 1926, reports on the middle section of the Snake River were concerned with the possibilities of improved river navigation. By the late 1940's, multiple-purpose river development plans were being formulated, particularly by the Corps of Engineers. Coordinated plans of the Secretary of the Interior and the Division Engineer, North Pacific Division, Department of the Army, published October 1, 1948 (1) considered Snake River development as an integral part of the comprehensive plan for the Columbia River Basin. Originally, the Nez Perce site on the Snake below its confluence with the Salmon River was proposed as a possible dam site by the Corps of Engineers. The Mountain Sheep site immediately above the mouth of the Salmon River was proposed as an alternative because of the recognized impact of the Nez Perce dam on anadromous fish runs of the Salmon River.

(2) The Hell's Canyon Controversy

As the result of a Congressional directive, the Corps of Engineers prepared studies for possible projects on the Snake River between Lewiston and the mouth of the Salmon River and also on the Clearwater. In addition, the Bureau of Reclamation undertook similar studies of the Snake River above the confluence of the Salmon River to Pittsburg landing, including potential diversion of flows from the Salmon River. These reports were available in 1953 and 1954, respectively. A joint report to the Secretaries of Army and Interior, dated May 21, 1954, proposed construction of the Mountain Sheep and Pleasant Valley dams by the Bureau of Reclamation, and of Bruce's Eddy (Dworshak dam) and Penny Cliffs dam by the Corps of Engineers on the North and Middle Forks of the Clearwater River, respectively.

In April, 1954, the Pacific Northwest Power Company, (PNPC), was incorporated in the State of Oregon, thereby combining four private utility companies: Pacific Power and Light; Portland General Electric; Montana Power; and Washington Water Power Companies. In the fall of 1954, PNPC filed with the Federal Power Commission for the Mountain Sheep site and the Pleasant Valley site (Fig. 1). They were granted a preliminary permit and then filed a license application (Project No. 2173) for the

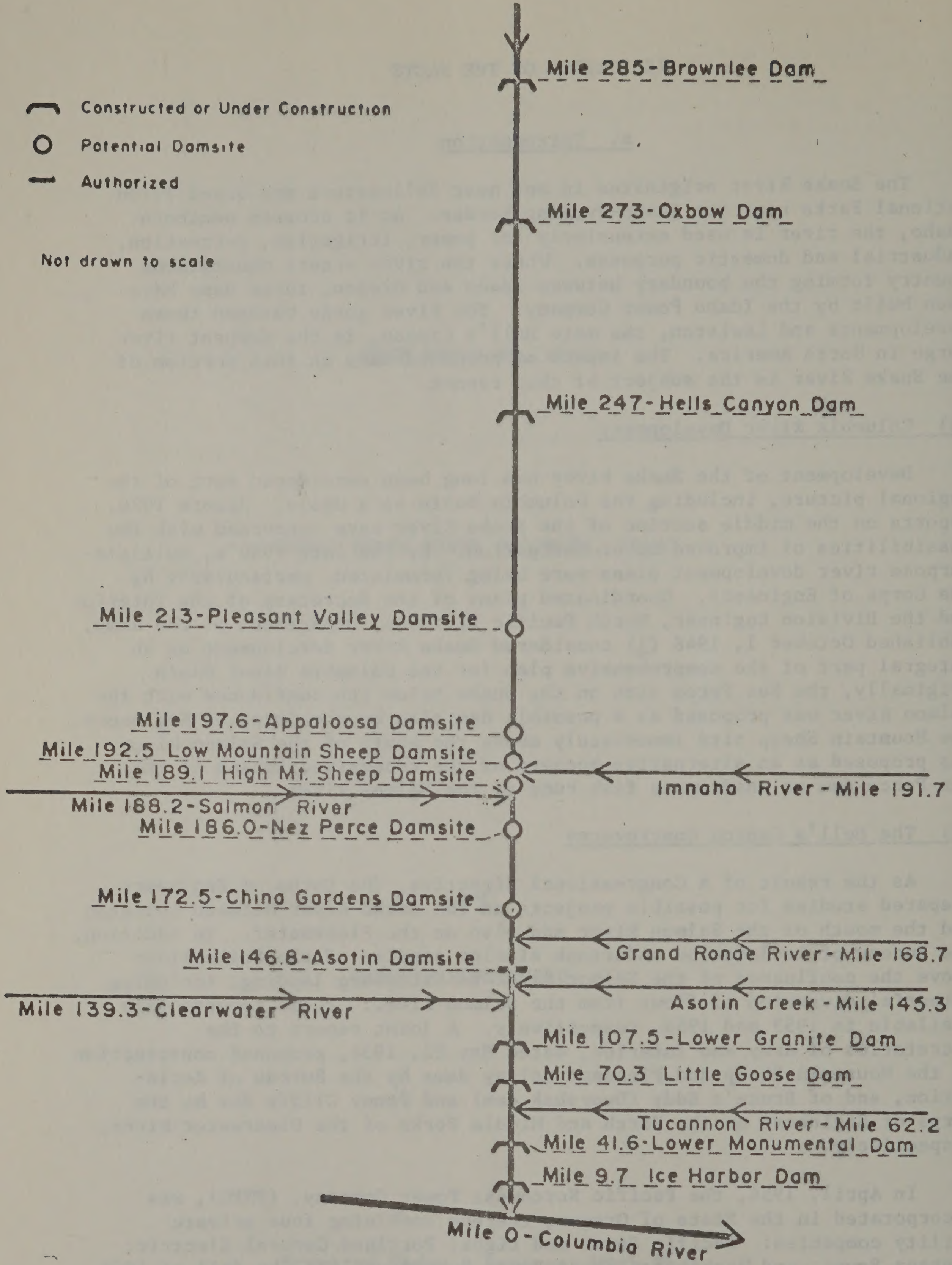

Constructed or Under Construction
Potential Damsite
Authorized
Not drawn to scale
Mile 285-Brownlee Dam
Mile 273-Oxbow Dam
Mile 247-Hells Canyon Dam
Mile 213-Pleasant Valley Damsite
Mile 197.6-Appaloosa Damsite
Mile 192.5 Low Mountain Sheep Damsite
Mile 189.1 High Mt. Sheep Damsite
Imnaha River-Mile 191.7
Mile 188.2-Salmon River
Mile 186.0-Nez Perce Damsite
Mile 172.5-China Gardens Damsite
Grand Ronde River-Mile 168.7
Mile 146.8-Asotin Damsite
Asotin Creek-Mile 145.3
Mile 139.3-Clearwater River
Mile 107.5-Lower Granite Dam
Mile 70.3 Little Goose Dam
Tucannon River-Mile 62.2
Mile 41.6-Lower Monumental Dam
Mile 9.7 Ice Harbor Dam
Mile 0-Columbia River

Fig. 1. Schematic Map-Snake River from mouth to Brownlee Dam

Mountain Sheep-Pleasant Valley hydro-electric project on September 7, 1955. The application was denied in January, 1958 after some fifty-four days of hearings. In March, 1958, PNPC filed an application for license to construct the High Mountain Sheep project on the Snake River (Project No. 2243).

In March, 1960, the Washington Public Power Supply System, a group of sixteen public utility districts of the State of Washington, filed application with the Federal Power Commission (FPC), for a license for the Nez Perce project (Project No. 2273). This was later amended to substitute the High Mountain Sheep project for the Nez Perce.

In 1960, the Secretary of the Interior communicated to the Commission his views that no projects on the Middle Snake would be desirable for some time because of problems of the vital Northwest anadromous fishery source and ratifications of the proposed Columbia River treaty with Canada. The Corps of Engineers in 1961, the Secretary of the Interior in 1962, and the Secretary of the Army in 1962, recommended that authorization of High Mountain Sheep and Penny Cliffs projects be deferred pending further study of the values of fish, wildlife and other conservation problems.

In June, 1962, the Secretary of the Interior recommended to the Commission that, because of the nature of federal interests involved in development of the Snake River area, the Commission should recommend federal construction of the High Mountain Sheep dam. In October, 1962, the Commission granted PNPC a license to build High Mountain Sheep dam and denied the Washington Public Power Supply System request. Subsequently, the Secretary of the Interior became a formal intervener, urging federal construction of High Mountain Sheep. In 1964, after oral arguments and review of filings, the Commission reaffirmed its decision for PNPC. Following a re-hearing, a court appeal was filed resulting in the Supreme Court decision of June 5, 1967, remanding the project to the Commission.

In September, 1967, PNPC and the Washington Public Power Supply System agreed to develop the Middle Snake River, including the High Mountain Sheep project, in cooperation with each other and, to the extent that it be feasible, with the Department of the Interior. The amended applications for licenses are now treated as single joint applications before the Commission (1). They are still under consideration.

In November, 1968, the Secretary of Agriculture filed a letter with the Commission stating that "a dam at the High Mountain Sheep location is incompatible with natural resource values and should not be built." (2) By August, 1969, the Department of the Interior announced its decision to support a "moratorium on the construction of any facility on the Middle Snake." (3)

(3) The Forces Involved

Proponents of dam construction center their argument on the electrical power deficit in the Pacific Northwest and the economic importance of electricity in attracting new industry, including the benefits of flood control, irrigation, recreation, and tourism. Opponents of dams contend that the lost fish and wildlife resources are irreplaceable, that a free-flowing river is an incomparable asset and a recreation and tourist attraction in itself, and that something unique will be lost if the dams are built.

ENVIRONMENTAL IMPACT

b. Air Quality

No specific claim regarding deterioration of air quality as a result of the Hell's Canyon projects has been found. It is quite obvious, however, that because of the topographic situation of the deep canyons of the Snake River any air pollution source would tend to concentrate in the bottom of the canyon because of normal inversion processes. The problems of air pollution at Lewiston, Idaho where the Clearwater River joins the Snake, are quite evident because of this inversion phenomonen.

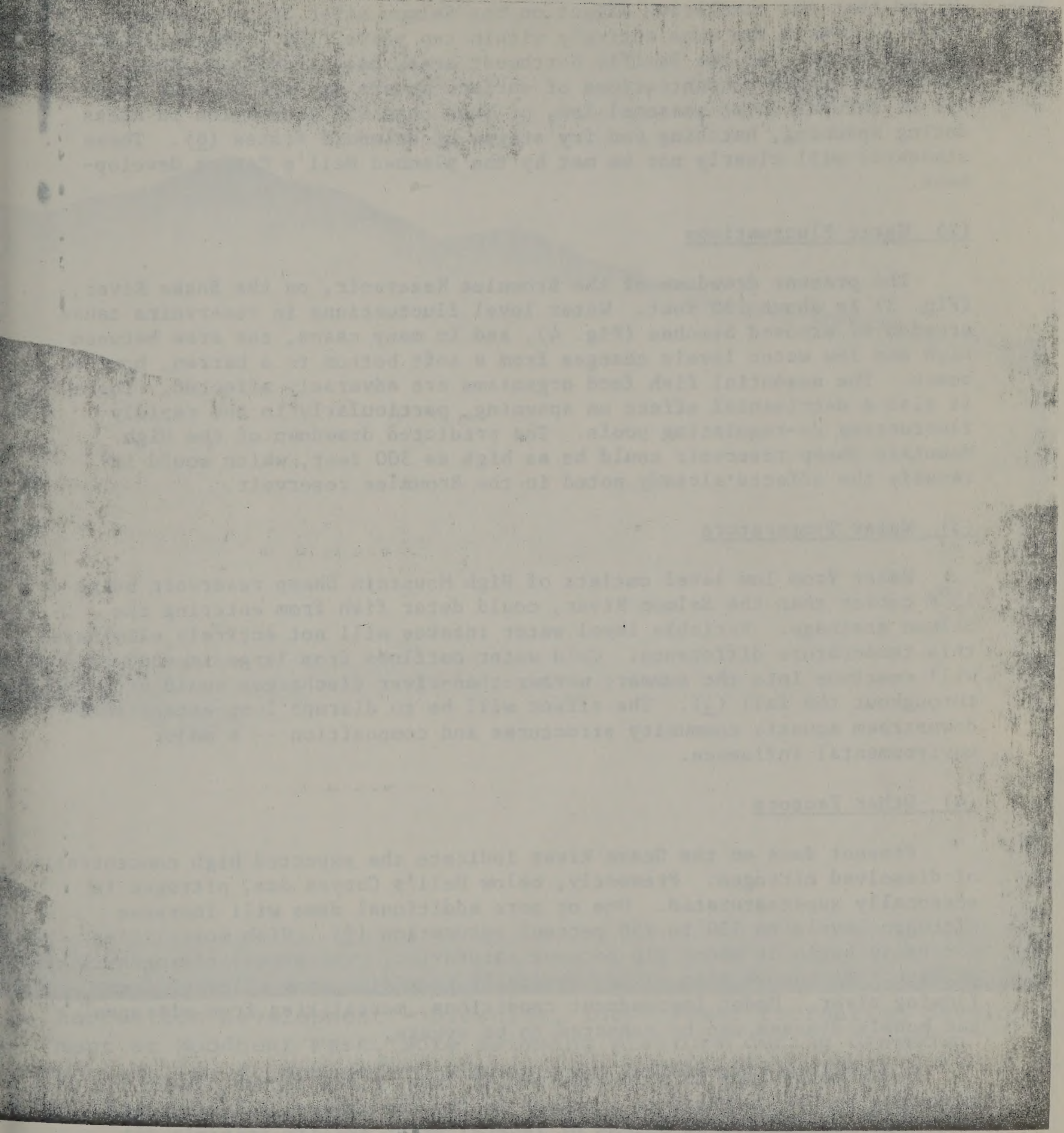
It can logically be predicted that sources of air pollution, if present, will impair the air quality within Hell's Canyon itself. This will be true of any motorized construction equipment present during the construction period, or any industrial development which might be planned in the canyon area.

c. Water Quality and Fisheries

(1) Oxygen Depletion

Lowered oxygen is one of the problems anticipated in the long, deep reservoir impoundments planned on the Snake River. The predicted stratification (1) would result in minimul oxygen exchange between the upper layers and the lower waters. The depths of the High Mountain Sheep reservoir would become oxygenless for a considerable part of the year. Oxygen might also disappear in the river water levels (2). Some believe that the High Mountain Sheep reservoir would develop water characteristics similar to Brownlee (Fig. 2) where severe oxygen depletion developed below surface layers when surface temperatures were as high as 75°F (5). The absence of oxygen made fish passage impossible during fall and late summer, even when temperatures were not critical. Lowered oxygen and algae growth have also been detected in American Falls reservoir. These conditions were not altered by drawing off the warmer surface layers with multiple level outlets (12).

On the basis of depleted oxygen levels in the Brownlee and other reservoirs, in contrast to the high levels in the free-flowing streams (2) (4) it can be expected that low oxygen can delay or block upstream migrating salmon and steelhead on the Salmon, Imhana, Grande Ronde, Snake and Clearwater rivers (5). The importance of the Columbia River salmon fishery has been emphasized elsewhere (9) and will not be repeated here. It should be emphasized that with no free-flowing river remaining, any procedures for mitigating other problems relating to these salmon runs would be futile (10).



2. Brownlee Reservoir. This reservoir is further upstream and out of the mountain canyon. Shore lines are still steep and limit the number of recreation sites available for development. (K. E. Hungerford photograph, December 13, 1969)

Low oxygen releases from the High Mountain Sheep Reservoir cannot be adequately aerated during high volume peaking flows. It is predicted that the cumulative effect on the Salmon River Salmon Fishery could eliminate the runs entirely within ten years (10). The Pollution Control Council of the Pacific Northwest area, has established that dissolved oxygen concentrations of surface waters may not be less than 75% of saturation at seasonal low, or less than 95% saturation in areas during spawning, hatching and fry stages of salmonid fishes (6). These standards will clearly not be met by the planned Hell's Canyon development.

(2) Water Fluctuations

The present drawdown of the Brownlee Reservoir, on the Snake River, (Fig. 3) is about 100 feet. Water level fluctuations in reservoirs cause erosion of exposed beaches (Fig. 4), and in many cases, the area between high and low water levels changes from a soft bottom to a barren, boulder beach. The essential fish food organisms are adversely affected. There is also a detrimental effect on spawning, particularly in the rapidly fluctuating re-regulating pools. The predicted drawdown of the High Mountain Sheep reservoir could be as high as 300 feet, which would intensify the effects already noted in the Brownlee reservoir.

(3) Water Temperature

Water from low level outlets of High Mountain Sheep reservoir being 15°F cooler than the Salmon River, could deter fish from entering the Salmon drainage. Variable level water intakes will not entirely eliminate this temperature difference. Cold water outflows from large impoundments will continue into the summer; warmer-than-river discharges would extend throughout the fall (1). The effect will be to disrupt long-established downstream aquatic community structures and composition -- a major environmental influence.

(4) Other Factors

Present dams on the Snake River indicate the expected high concentration of dissolved nitrogen. Presently, below Hell's Canyon dam, nitrogen is seasonally supersaturated. One or more additional dams will increase nitrogen levels to 130 to 150 percent saturation (9). Fish mortalities generally begin at about 110 percent saturation. The excess nitrogen is very difficult to remove from water, typically requiring many miles of free-flowing river. Under impoundment conditions, mortalities from nitrogen gas bubble disease can be expected to be severe.

Heavy metal ions in solution such as iron, zinc, copper, lead, and mangenese can be expected to increase in the low oxygen, slightly acid, deep reservoir waters in excess of federal water quality criteria (4). These ions are potentially dangerous to organisms since they accumulate in body tissue.

(5) The Fishery Resource

It is anticipated that if the High Mountain Sheep dam were built, the largest remaining white sturgeon spawning and rearing areas would be

3. Recreation Development - Brownlee. Idaho Power recreation development at Woodhear Park. Note swimming platform during drawdown period. (K. E. Hungerford Photograph, December 13, 1969)

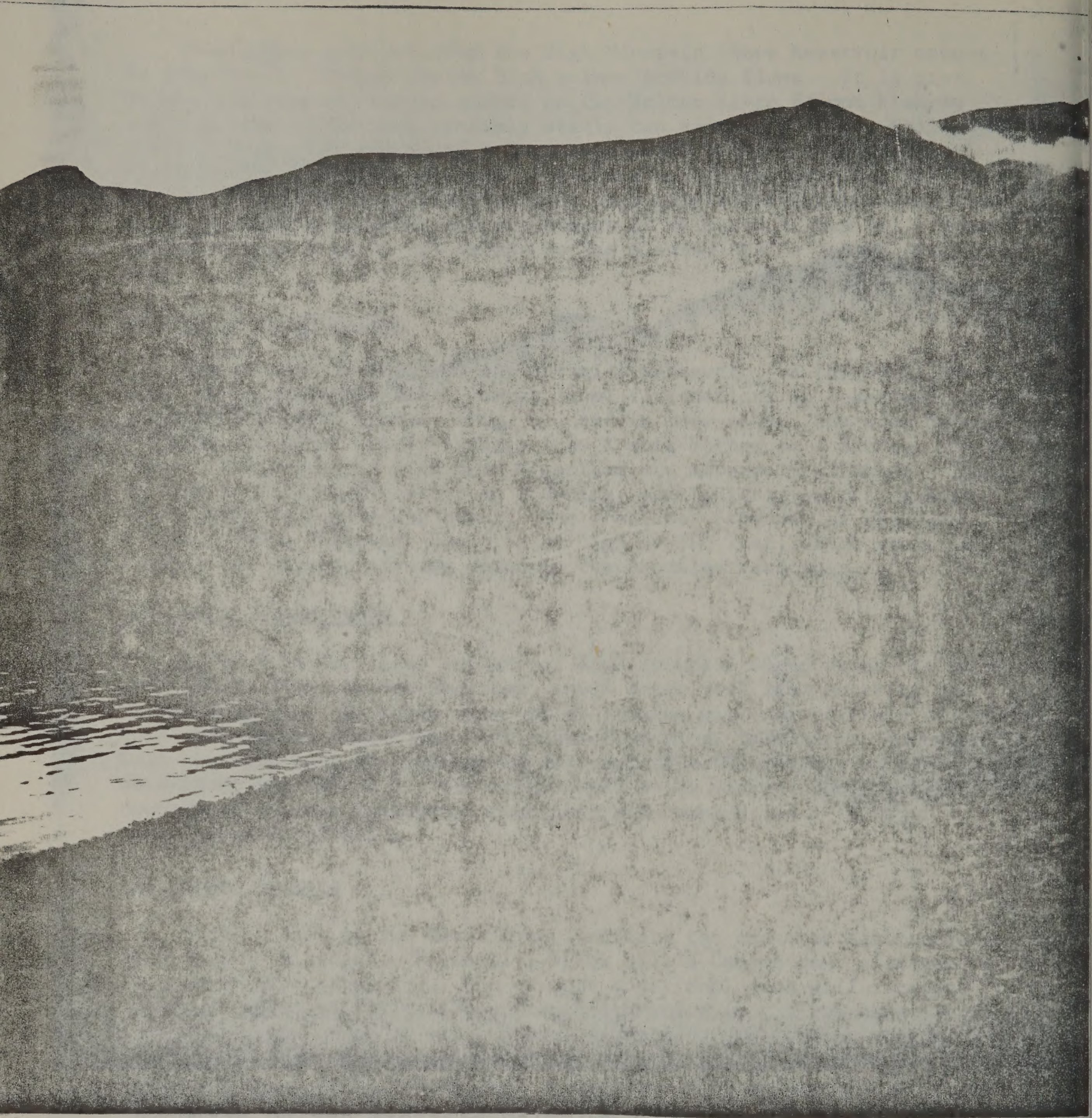


Fig. 4. Recreation Development - Brownlee. Idaho Power Recreation development at Woodhead Park. Note boat docks during drawdown period. (K. E. Hungerford Photograph, December 13, 1969).

eliminated. This could constitute an irreplaceable loss since white sturgeon are now restricted to a few remaining free-flowing river stretches in the Columbia system. It can be expected that channel catfish will be smaller in the reservoirs than in the free-flowing river, that the small mouth bass fishery would be restricted to the upper portions of the reservoirs, and that any proposed trout fishery in the High Mountain Sheep reservoir would most likely be unsuccessful (9).

d. Wildlife Habitat and Wildlife

The big game winter range in the Middle Snake River lies generally below the 4,000 foot level (Fig. 5). From Hell's Canyon dam to China Gardens damsite there are more than 350,000 acres of winter game range which is complemented by a much larger area of fall, spring and summer range in the higher mountains. The amount and the productive capacity of the winter range holds the key to the management of big game herds over a large section of Oregon and Idaho. The winter range inundated by the proposed project developments is at the lowest elevation and, therefore, is most critical in severe winter conditions. It can be the key to survival of big game during a severe winter.

Mule deer and Rocky Mountain elk are the principal big game species occupying these ranges. Black bear are widely distributed and big horn sheep populations were once found in the canyon and adjacent mountain areas. The potential for re-establishing big horn sheep herds exist, but this may become more difficult after impoundment.

The Middle Snake river canyon has a high capacity for the production of upland game birds. The chukar partridge introduced within the last 20 years is abundant along the lower canyon slopes. Mountain quail are abundant, along the brushy draws leading down to the river (18). Partridges, quail and mourning doves concentrate along the river shoreline when other intermittant streams are dry in late summer. Blue grouse and ruffed grouse are present generally at higher elevations. Canada geese nest in the cliffs along the river. Some 100 - 150 adult geese produce 200 - 300 young annually. Golden eagles are common and easily observed. Fur bearers, such as beaver, otter, mink, muskrat and raccoons are common (13, 17).

Combined wildlife populations of the area can be expected to support about 140,000 hunter-days annually in the near future. The esthetics and intangibles associated with hunting in and near this relatively undisturbed wild canyon, have values that substantially exceed those of hunting the same species in more ordinary locations. These intangibles, and the opportunity for a variety of hunting and fishing, make this a unique area, even for Idaho and Oregon (13, 17).

Any of the four impoundment construction plans (Fig. 6) (Table 1) should result in losses to big game resources. Mule deer would be significantly affected in Idaho but both mule deer and elk-use lands would be affected in Oregon. The losses of habitat and estimates of losses of deer and deer hunting days associated with reservoir development are shown in Table 2 (1). Losses include the direct effects of inundation of

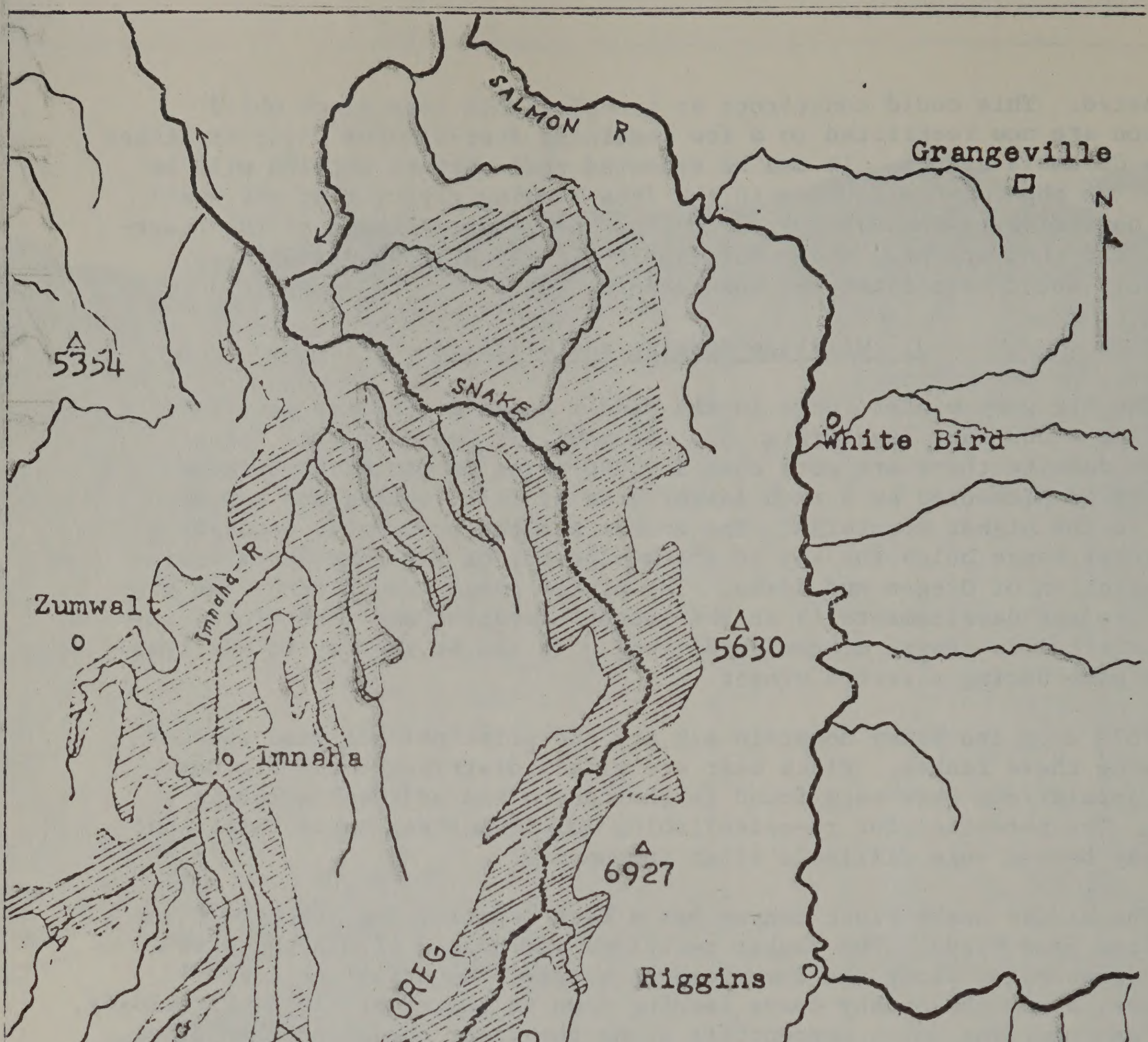


Figure 5
Winter Big Game Range within the Middle Snake Area affected by impoundments.

River Profile Under
Proposed Plans

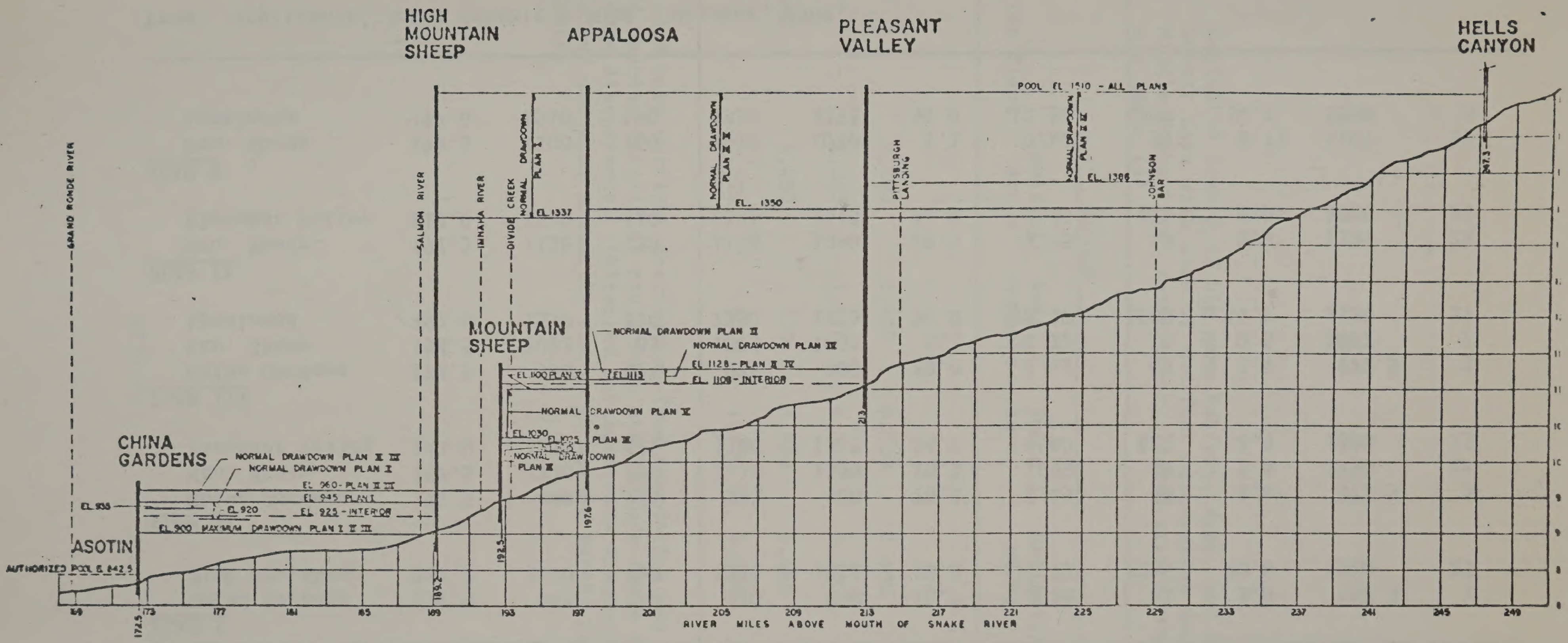


Figure 6

Table 1. Some Physical Characteristics of Middle Snake River Project.

	River mile (miles)	Pool Elev. (norm) ft-msl	Max. head ft	Drawdown (norm) ft-msl	Drawdown (max) ft-msl	Reservoir Length miles	Pool area (max) 1000 acres	Reservoir capacity (norm) 1000 acre-feet	Land Acquisition 1000 Acres	Top of Dam ft-msl	Access roads miles (includes improv. existing)
PLAN I											
China Gardens	172.5	945	110	920	900	16.7	2.20	41	3.0	957.5	3
High Mtn Sheep	189.2	1510	590	1337	1212	58.0	17.70	2250	20.0	1520	25
PLAN II											
China Gardens	172.5	960	125	935	900	20.0	2.45	48	3.4	972.5	3
Mtn. Sheep	192.5	1128	188	1113	1100	20.5	1.95	28	2.6	1135	28
Pleasant Valley	213.0	1510	410	1386	1315	34.0	6.60	622	8.0	1520	25
PLAN III											
China Gardens	172.5	960	125	935	900	20.0	2.45	48	3.4	972.5	3
Mtn. Sheep	192.5	1025	85	1005	1000	5.1	0.22	5	0.5	1057	2
Appaloosa	197.6	1510	510	1350	1255	50.0	12.30	1500	14.5	1520	31
PLAN IV											
Mtn. Sheep	192.5	1128	188	1108	1090	20.5	1.95	37	2.6	1135	28
Pleasant Valley	213.0	1510	410	1385	1315	34.0	6.60	622	8.0	1520	25
PLAN V											
Mtn. Sheep	192.5	1100	160	1030	1030	5.1	0.425	30	0.75	1107	28
Appaloosa	197.6	1510	480	1350	1255	50.0	12.30	1500	14.5	1520	5

From: Applicants' Joint Exhibit R-501A. October, 1969.

Table 2. Estimated losses of big game habitat, deer, and annual deer hunter days with each of the four alternative dam plans for Middle Snake River development, listed separately for Oregon and Idaho (1)

	OREGON			IDAHO		
Alternative Plans	Habitat1/ acres	Deer numbers	Hunter days	Habitat1/ acres	Deer numbers	Hunter days
No dam	0	0	0	0	0	0
HMS & CG	9,200	1,250	6,250	7,480	200	1,000
HMS	8,960	1,220	6,100	7,180	190	950
App. & LMS	5,430	770	3,850	6,480	190	950
PV & LMS	2,570	380	1,900	4,480	120	600

1/ Includes only outright destruction from inundation and areas taken by roads, access facilities etc.; does not include lands reduced in value by human disturbance. (Affected acreages vary disproportionately by state and project, primarily due to different access routes with various projects).

habitat, the loss of upland game bird and waterfowl habitat. Table 3 summarizes the estimated upland game bird losses.

Upland game bird losses may be mitigated to some extent by the construction of watering devices (guzzlers). The present goose nesting sites in cliffs would be inundated, but cliff areas adjacent to the reservoir pools may be used by geese, offsetting loss of current nesting sites (13).

Perhaps the most difficult mitigation procedures would be replacing big game winter ranges inundated or affected by other forms of land use. Additional forage production could be provided in the area below the 2,500 foot elevation and above the pool elevation by purchase of private lands now used for livestock production. During very mild winters, big game should have little difficulty sustaining themselves on lands above the proposed pool, but in the more severe winters the animals are normally down on the river bars and lower benches, and loss of these areas could be critical. When elevation is lost at the bottom of a canyon, full replacement cannot be expected from areas at higher elevation. Estimates of big game replacement land, needs and costs for the alternative projects are shown in Table 4. However, in the judgment of the writer, planning for the mitigation of losses of big game winter range through development of higher elevation lands is generally not successful. The low elevation portions of a canyon are an integral part of the total complex. This is somewhat like government telling the citizen "we must have the foundation of your home. We will take it away but we will mitigate your loss by providing two new walls and one extra new roof." These obviously cannot compensate for the loss since a new roof is little help if you are living in the mud. This is also true with big game mitigation because adequate summer range is available, and normally plenty of spring and fall range. The item which most limits the sizes and the quality of the big game herds is the amount and quality of the big game winter range itself.

e. Vegetation Patterns

The most striking feature of the Hell's Canyon vegetation is the series of habitat types occurring at different elevations. This canyon, deeper than the Grand Canyon of the Colorado, exhibits a changing ecological pattern from grassland vegetation near the river to timbered slopes and alpine vegetation on some mountain peaks (Fig. 7).

One of the distinctive units of vegetation which would be inundated by the reservoir pools is the riparian vegetation dominated by shrubs and small trees, and growing on sites where additional subsoil moisture compensates for the dry climate. This type of vegetation is highly important as cover for wildlife and is a scenic attraction in a predominantly grassland portion of the canyon. The vegetation type most affected by the reservoir pools would be the wheatgrass-bluegrass zone of the lower canyon (Fig. 8). This would be reduced by approximately the size of the combined reservoir areas, 20,000 acres in the case of Plan I (Table 1).

Table 3. Estimated losses of upland game habitat, birds, and associated annual hunter use with each of the alternative plans for the Middle Snake River (Oregon and Idaho combined). (1)

Alternative Plan	Habitat acres	No. of birds	No. Hunter-days (annually)
No dam	0	0	0
HMS & CG	16,680	2,570	1,210
HMS	16,140	2,370	1,110
App. & LMS	11,910	1,840	880
PV & LMS	7,050	960	450

Table 4. Estimated big game compensation land needs and costs associated with the four plans for dam development on the Middle Snake River (1).

Alternate Plans	Deer Months Capacity Needed	Acres Required	Cost @ $50 and $75 per acre
OREGON			
HMS & CG	7,820	6,250	$312,500 or 468,750
HMS	7,620	6,090	304,500 or 456,750
App. & LMS	4,830	3,860	193,000 or 289,500
PV & LMS	2,410	1,920	96,000 or 144,000
IDAHO			
HMS & CG	1,320	1,060	$ 53,000 or 79,500
HMS	1,270	1,020	51,000
App. & LMS	1,260	1,000	50,000 or 75,000
PV & LMS	810	650	32,500 or 48,750

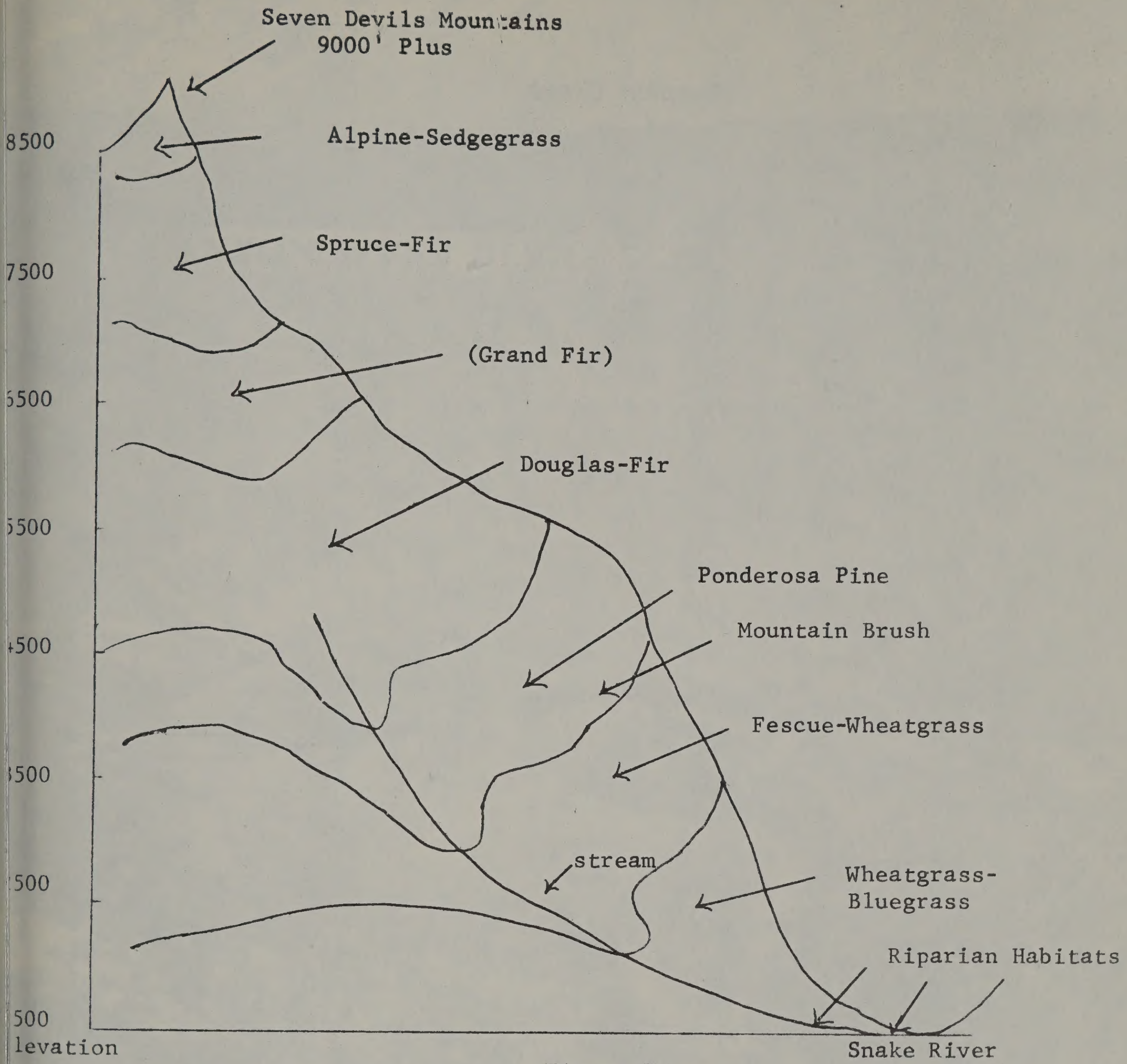


Figure 7

Distribution of vegetational zones in Hell's Canyon Area. Altitudes are approximate, and are greatly modified by the direction of slope facing. Generally, zones follow lower along a stream course and a north-facing slope. The same zone is generally higher on a south-facing slope.

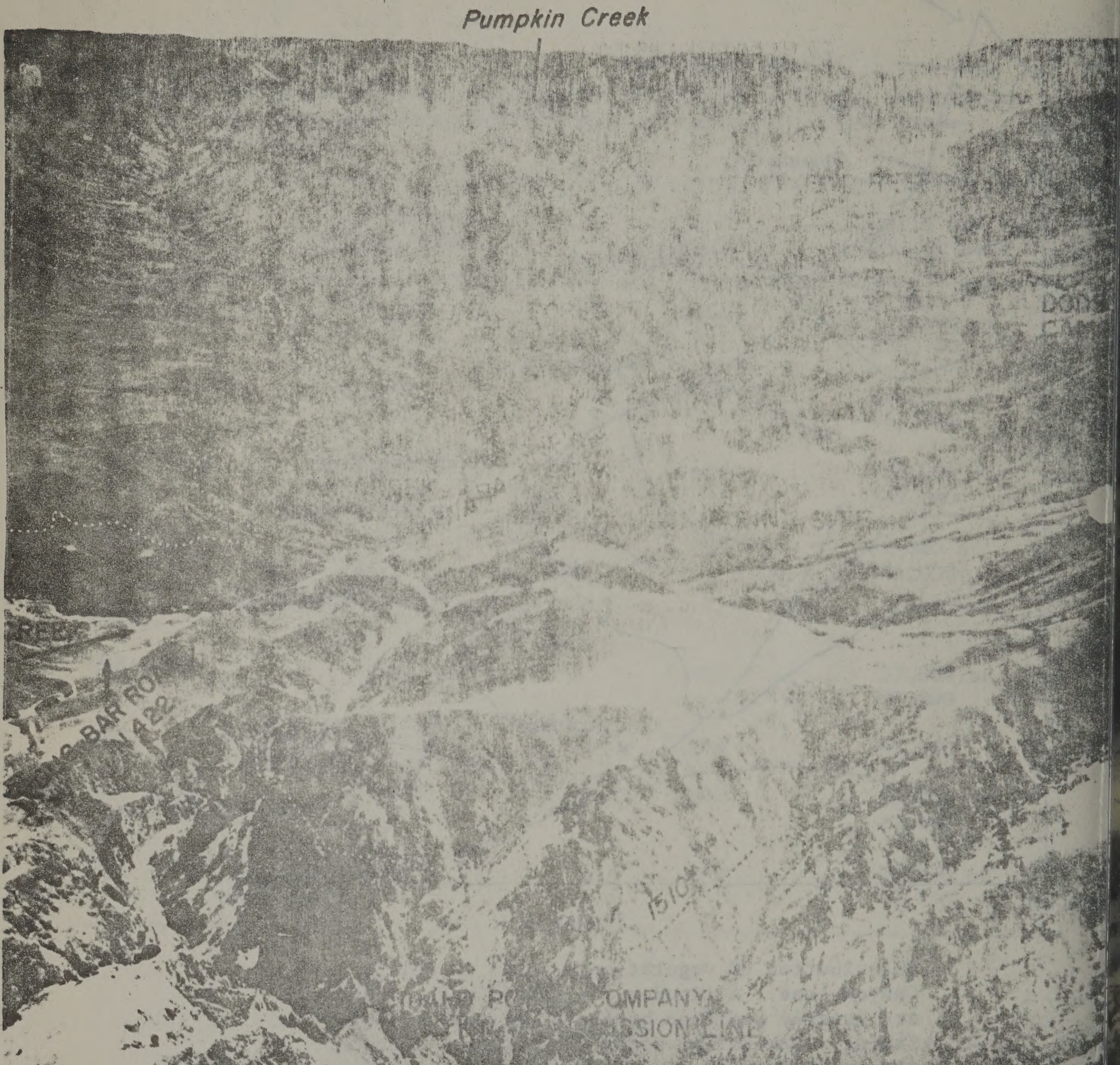
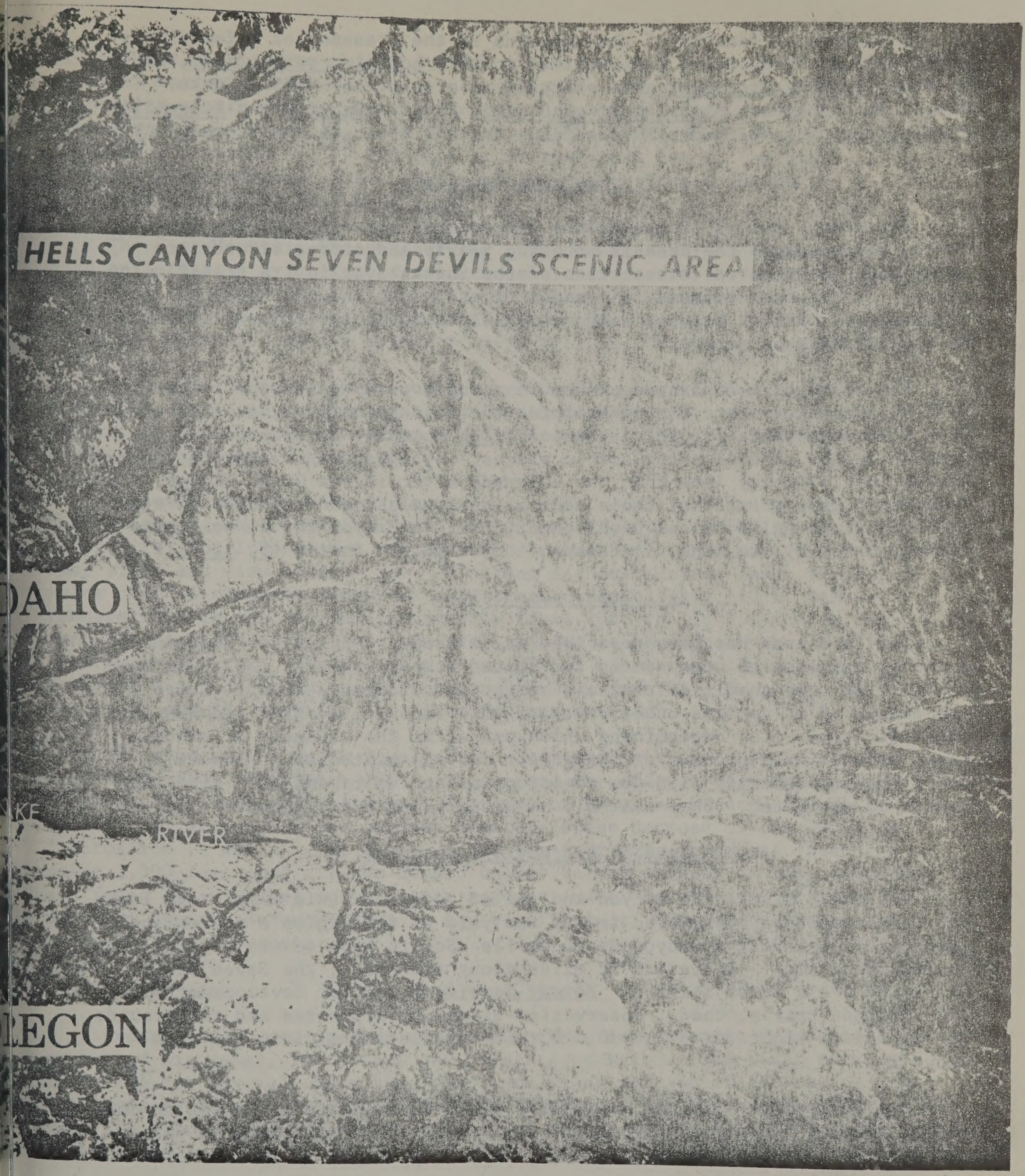


Fig. 8. Imnaha River at upper end of High Mountain Sheep pool. Here recre- tional development may be in conflict with winter game range use. (U.S. Forest Service photo)



.9. Hell's Canyon and Seven Devils Mountains. This is the deepest portion of the canyon. The vegetation zones shown in Figure 7 are well illustrated here as well as the interfingering with timber coming down Granite Creek and grass zones going up the south-facing slopes. This is relatively undisturbed, natural vegetation. (U.S. Forest Service photo)

A noteworthy feature of the vegation is the presence of a few plants found only in this area. Two species, an herb Lomatium serpentinum, and a shrub, Rubus bartonianus grow only in the area of the Middle Snake. Three other species, Mirabilis macfarlanii, Phlox colubrina and Nemophila kirtleyi occur only in the Middle Snake and the Lower Salmon canyons. (31)

f. Scenic Resources

The scenic values of the Hell's Canyon area are depicted frequently. Public awareness of the area is mounting yearly and strong efforts are being made to preserve this section of the Snake River in its free-flowing state. As the last remnant of a major river in the United States untrammeled by man, it has not been thoroughly studied in terms of its value as a wild and scenic river.

The value of a landscape cannot be reduced to a "cost-benefit ratio." Several scoring systems for classifying the recreational value of streams have been developed (13, 12). Leopold (22) recently developed an objective method of evaluating scenic places. By this method, Hell's Canyon scores only slightly less than the Colorado River in the Grand Canyon. Both are highly prized for their recreational values and strongly coveted by those planning technical development. Hell's Canyon has an aesthetic rating shared by few other landscapes in the United States (5, 11, 12).

g. Wilderness Values

Hell's Canyon has been described as "a scene of primitive ruggedness probably not equaled anywhere in the United States today." (26). Without doubt it has the qualities that are sought in wilderness areas. These are described in various other parts of this report. A major problem is classification, i.e. determining which parts fit the criteria of wilderness, as well as a problem of management and administration. Losses to the wilderness quality with dam construction are valid and of a kind that cannot be mitigated. They can only be anticipated and avoided.

h. Outdoor Recreation Resources

The Snake River, the canyon and the adjacent mountain complex in Idaho and Oregon must be considered in any analysis of the region's recreational resources. The Hell's Canyon-Seven Devils Scenic Area covers 130,000 acres on the Idaho side. Extending 22 miles along the Snake, the Seven Devils Mountains are a major feature. Forest Service plans for development by 1972 include trails, roads, observation sites, picnic sites and campgrounds to accomodate eight times the 10,000 recreationists who visit the area annually.

The Snake River Limited Area, 203,330 acres of National Forest on the Oregon side of the river was created for further study of resource values aimed at the highest public use.

Current recreation in these areas is largely keyed to scenic viewing from mountain access points, hunting, fishing, and river-boating. Future use will depend largely on development of access roads and trails. Development of camp and picnic sites will be difficult. Suitable flat land, water supplies and shade trees are all lacking in the steep canyon. However, recreation visits can be increased manyfold by minor improvements in transportation systems (14). A recent study by the Idaho Fish and Game Department reported 50,107 man-days of recreational use in the High Mountain Sheep area for 1968. This involved an estimated 25,000 recreational visits to this area (28).

The High Mountain Sheep Reservoir plan or alternative developments also anticipate a great increase in recreational use of the area (14, 25). Generally, the reservoir developments will provide a water-based recreation facility, suitable for masses of people. Camping, boating, swimming, water skiing and scenic viewing will be the popular activities.

Lost will be the present quality recreation of river boating in a wilderness-type canyon, high quality fishing and hunting. These resources are termed "unique" in character and "irreplaceable once lost because of project development." (14, 25).

The existing impoundments upriver provide some clues about the recreation impact of these developments. At Oxbow, Brownlee and Hell's Canyon reservoirs, the Idaho Power Company has constructed boat ramps, picnic sites, camp sites and view points (20). Planting and cultivating shade trees is a major part of these developments and for good reason (Fig. 10): Summer temperatures in the canyon consistently reach 100° to 115°F., making shelter from the sun essential. This, in fact, limits recreation on the Idaho Power reservoirs upriver. The heaviest recreational use is usually recorded on Memorial Day. Early spring, March through May, and Fall, when temperatures are moderate, are the most popular times for recreational visits.

The fluctuating water level of impoundments is another problem to be contended with. Figures 4 and 3 illustrate the effects of moderate drawdowns on boat docks and swimming platforms on Brownlee Reservoir. This effect will be intensified on High Mountain Sheep because of the 300 foot fluctuation in water level. One prediction indicates that boat launching ramps 1,300 feet long will be needed unless better methods of boat launching are found (14). Under normal water regimes, water levels may be fairly constant during the summer but it may be difficult to maintain during the spring and fall seasons.

i. Land Use Changes

Present land uses include watershed protection, grazing (domestic livestock and big game), recreation and timber production. The first three of these are the key values on the lower, grassland portion of the canyon area, while watershed and timber are of prime importance in the portion above 4,000 feet elevation. The watershed, recreation and wildlife resources are treated in separate sections of this report.

Grazing of domestic livestock began about 1880 and reached a peak of intensity in the early 1900's. During this period most of the benchlands and the few tillable acres of canyon bottom were homesteaded. Later these

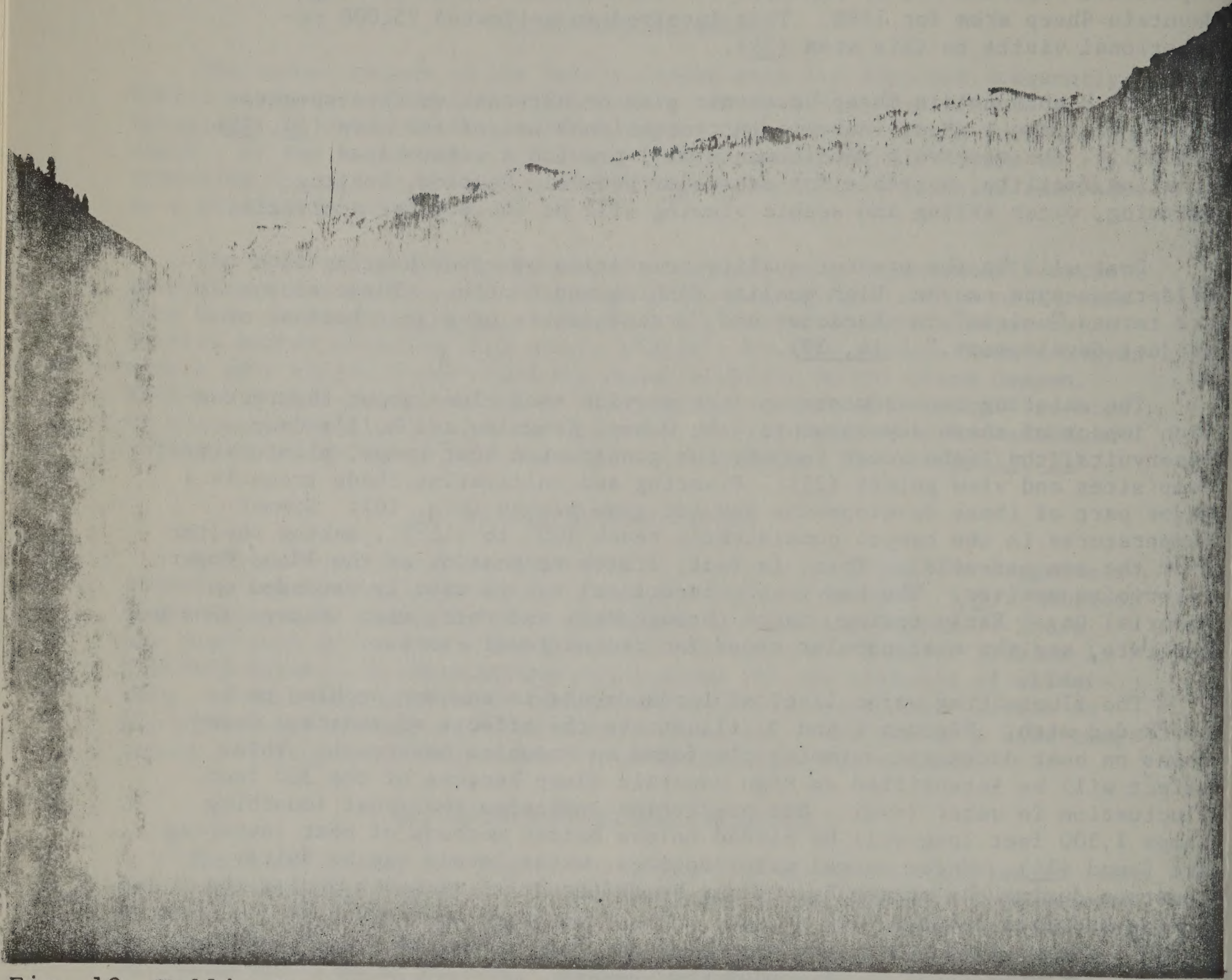


Fig. 10. Hell's Canyon Park built by Idaho Power Company on Hell's Canyon Reservoir. Trees planted for shade in the canyon are a must for summer recreation spots. Temperatures may reach well over 100°F during the summer, making spring and fall use more attractive. Trees are difficult to grow. They may require irrigation until they are established and since the canyon is part of winter game range, they will be subject to game use during severe winters. (Photograph by K. E. Hungerford, December 13, 1969)

were acquired by ranchers who developed permanent grazing operations. Establishment of the Wallowa-Whitman and Nez Perce National Forests in 1907-1909 brought better grazing management to much of the area, and many private holdings were later placed under the management of the Forest Service.

The lower grassland area provides some of the finest late fall, winter and spring range in the Pacific Northwest. Summer grazing is at higher elevations, mainly on National Forest lands. There are nine home ranches and 19 grazing allotments in the portion of the canyon to be affected by dam development.

Forest resources are negligible below 4,000 feet in the canyon, but the few scattered trees are valuable scenically and for shade in the summer. The upper fir, ponderosa pine, lodgepole pine and subalpine fir being the main commercial species. Little of this timber has been used because of difficult access and steepness of slopes. The Snake River Limited Area of the Wallowa-Whitman National Forest includes 203,230 acres temporarily reserved from timber harvest. Logging is restricted also in the Hell's Canyon-Seven Devils scenic area.

Ecology of the Hell's Canyon area has been gradually changed through past land use influences. Lower grasslands have in many areas reverted to a vegetation with annuals dominating. While this may contribute forage for spring livestock grazing it reduces winter forage for big game and creates a severe fire hazard. The cured annual grasses in Hell's Canyon are notorious "flash fuels" during the summer-fall fire season. This presents a major problem for managing agencies particularly with heavy recreational use and resulting man-caused fires.

(1) Impact of the Dams

The reservoir pools will flood key winter range, irrigated hay fields and ranch headquarters. Actual loss of winter range would be about 20,000 acres under Plan I; 8,550 acres in Plan IV, and 12,700 acres in Plan V. About 3,000 more acres would be lost to access roads, and unspecified amounts would be lost on and adjacent to recreation sites. Several livestock operations would probably lose their summer grazing permits on National Forests because of losing their winter feed base on canyon lands. Some will probably go out of business altogether. The loss in livestock grazing permits on government and private land is estimated at 7,960 animal unit months (one A.U.M. - grazing required for one cow or five sheep in one month). Additional acreage on unwaived private lands would also be involved. For example, 500 A.U.M. of grazing and 150 tons of hay per year would be lost by one ranch, the Circle C operation at Pittsburg Landing. Dislocation of livestock trails and management patterns would also cause grazing losses, particularly on the Idaho side of the river where bench lands are few and where some alternative trail routes would be on excessively steep slopes. On the Kirkwood sheep allotment, for example, use of 7,302 A.U.M.s would probably be lost because of dam development.

Some of the disruption of livestock grazing could be mitigated by construction of new trails, watering places and fences. The biggest complicating factor for the canyon-area livestock industry would be the need to mitigate the potential loss of big game range. Plans of the U. S. Forest Service and other land management agencies provide for an extensive shift in grazing use from livestock to big game to prevent drastic reductions in big game numbers. This would involve purchase of private grazing lands in the winter range area for the exclusive use of big game and some shift in grazing use on government lands. There would still be problems caused by loss of cover now provided by riparian vegetation of the river and streamsides and by disruption of animal movements due to flooded trails and the effect of flooded tributaries in preventing access to certain areas.

Virtually no timber resources would be affected by the dam development. New access roads would remove small amounts of forest, but the main detrimental impact would probably be the increased fire danger created by the greater recreational use of the area.

j. Historic and Archeological Values

There is ample evidence that the Snake River Canyon was inhabited by ancient tribes (1). Pictographs and petroglyps are not numerous but appear at village sites and river crossings. These are beyond knowledge of modern tribes. Artifacts also give evidence of ancient man in this area. Dr. Swanson, of Idaho State University, indicates that archeological study of these civilizations has been carried on at only two of some 160 to 200 potential sites (27). He points to the uniqueness of the Snake River sites because ancient cultures centered within this area and modern cultures such as the Nez Perce used it as well. One important fact is that 90% of the Columbia Basin archeology has been inundated by water projects and that suitable study was not possible before flooding. The recent Marmes site on the lower Snake is a good example of this trend.

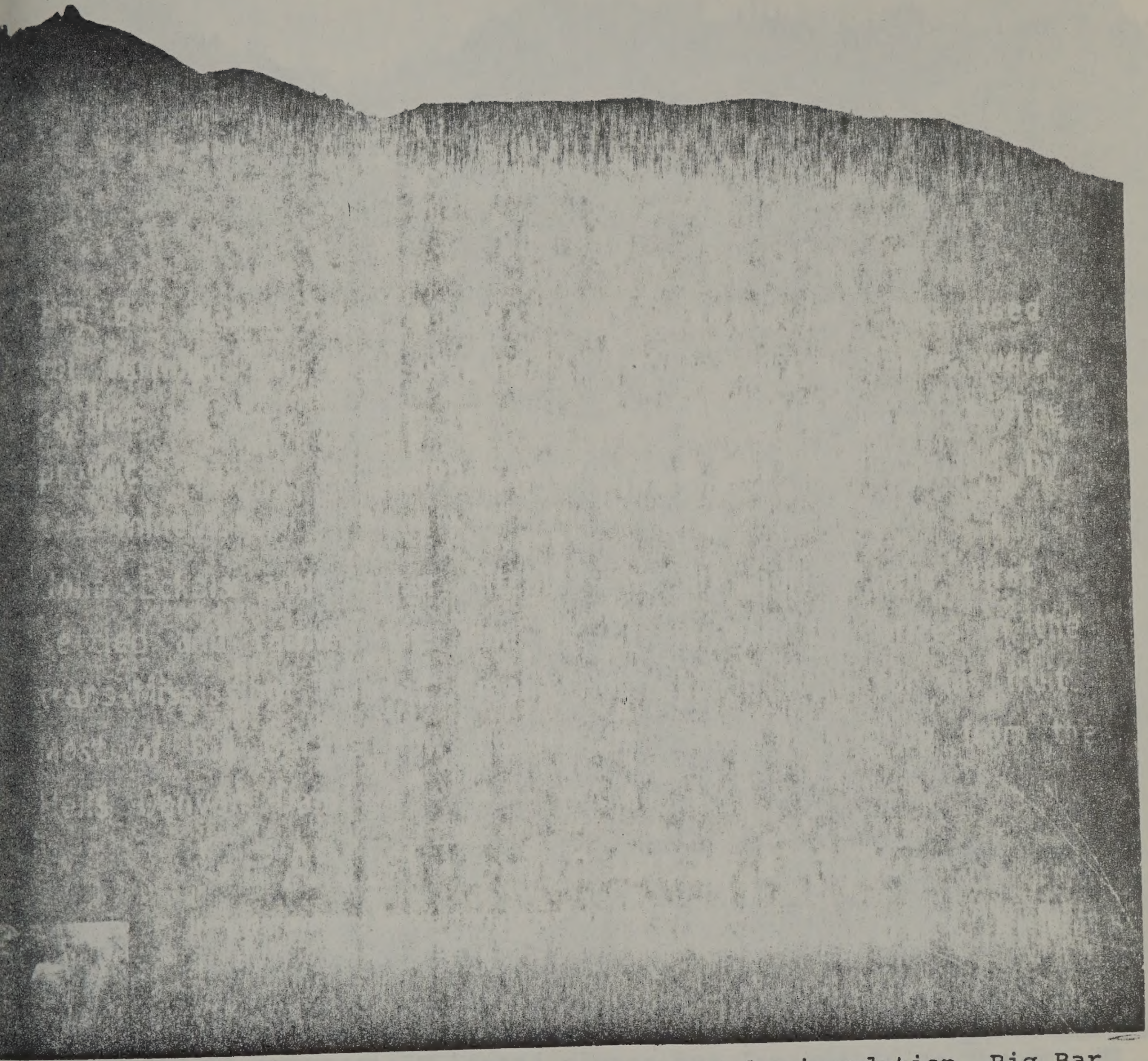
Evidence of modern history is also found throughout the Hell's Canyon area. Much is already covered by the three Idaho Power dams, (Figs. 11, 12). A site of major significance in the history of the West is reputed to be at Dug Bar. This is known as "Chief Joseph's Crossing" (Fig. 13) from the Nez Perce Indian crossing in 1877 (18). Because the river itself was the main route of travel, and the center of human activity, the historical values lost through flooding can be significant.

k. Watershed and Soils

The Middle Snake canyon constitutes a watershed remarkable for its extremely rugged topography. This watershed is important for water supply but even more as a potential source of soil erosion and stream siltation.

The soils are formed largely from lavas, especially basalts. Older metamorphic rocks outcrop near the canyon bottom. Loess deposits cover much of the basalt. The resulting soils are largely loams in texture, although coarser soils are common near the river. Soil depths vary from a few inches to several feet (29).

These soils are not highly erosive by nature, but the steep slopes on which they have formed present a continuing hazard. The lower elevations, with relatively sparse grass cover, are the most vulnerable. Soil slips occur even in the natural state, and their frequency and size are increased by disturbance. The area is also affected by occasional severe thunderstorms which cause severe local run-off and some erosion.



g. 11. Much may be lost of historical interest by inundation. Big Bar was flooded and what remains of history is now on the Forest Service sigh. (K. E. Hungerford Photograph, December 13, 1969)

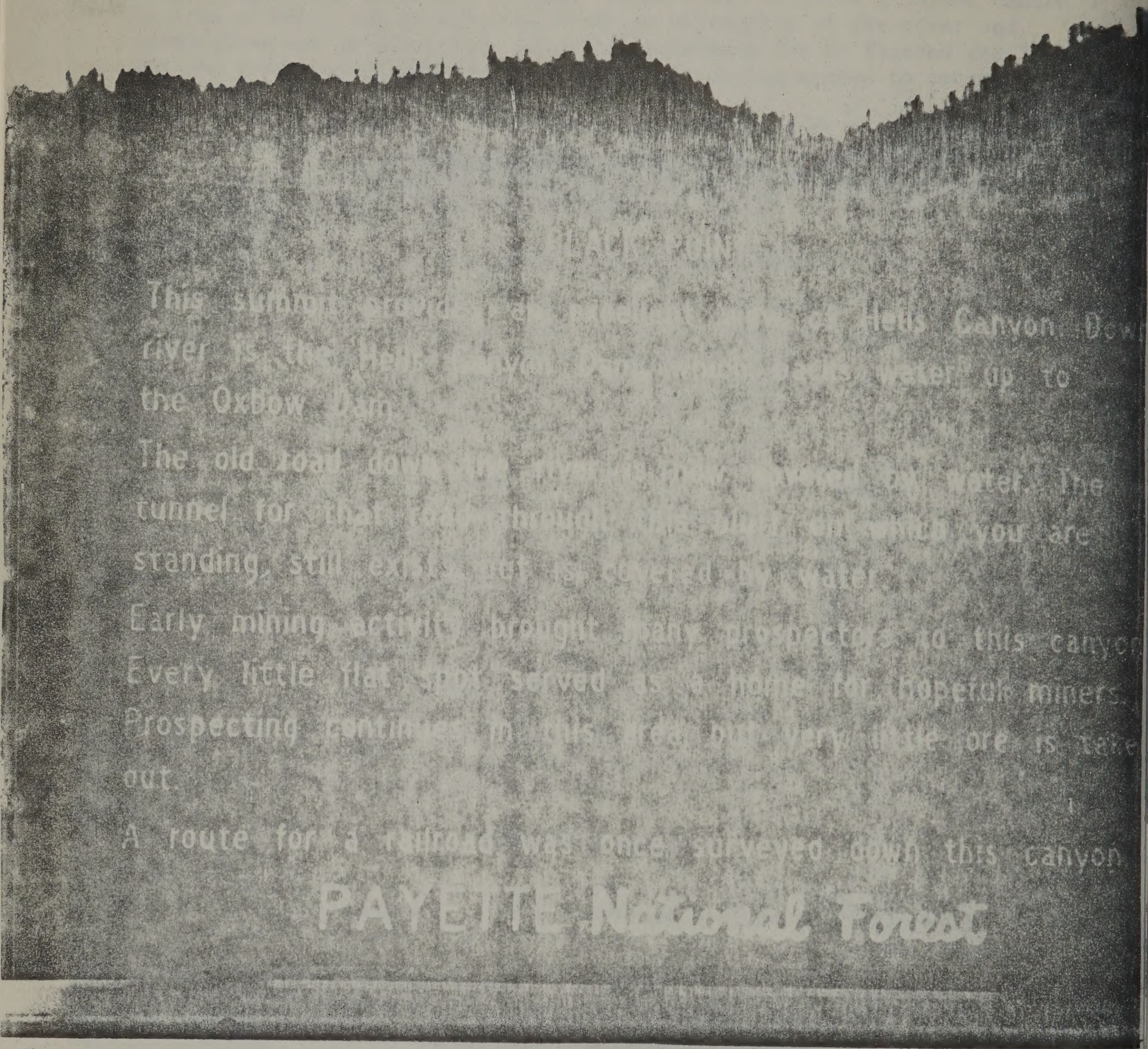
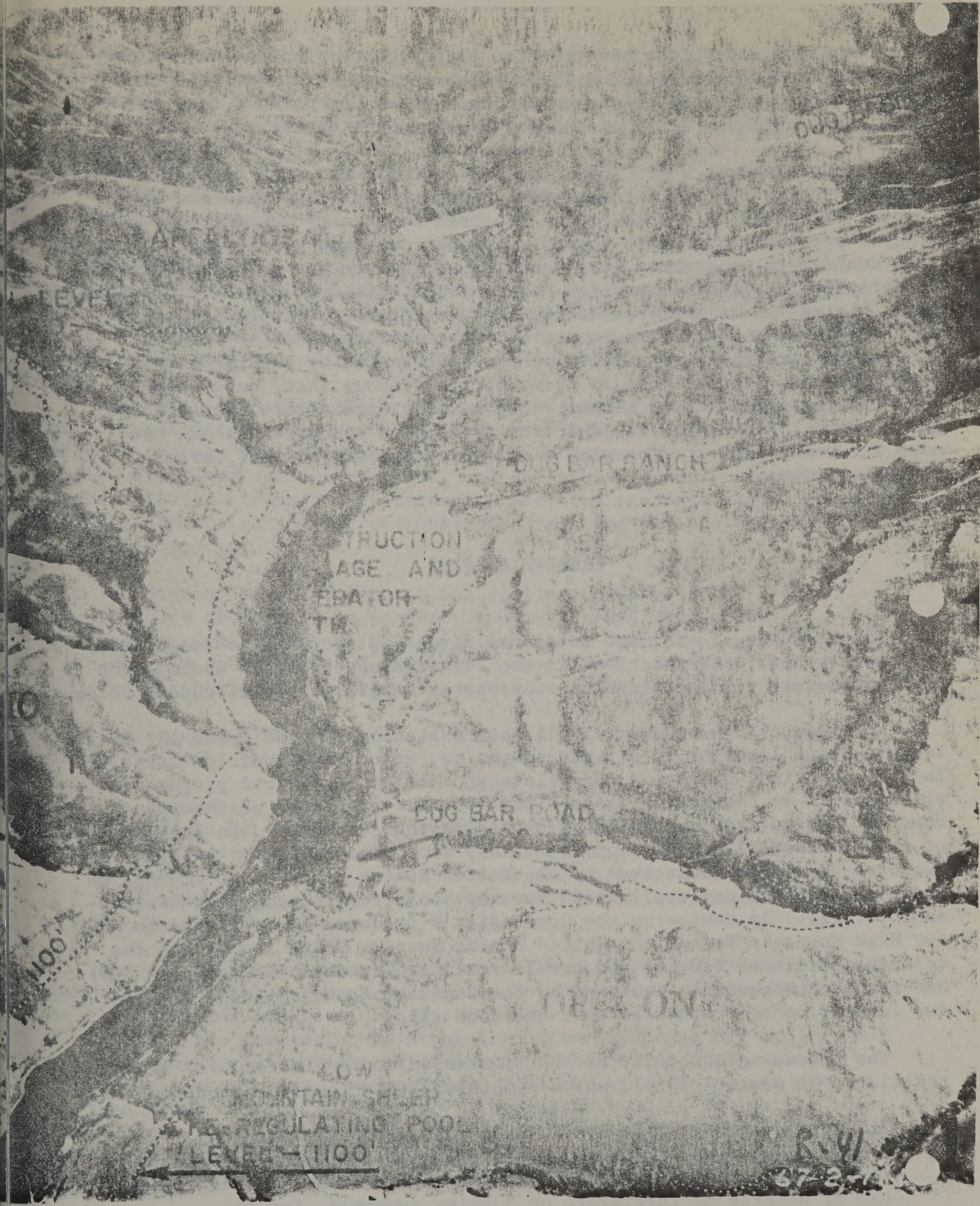

BLACK POINT
This summit provides ... of Hells Canyon. Dow
river is the Hells Canyon ... water up to
the Oxbow Dam.
The old road down ... by water. The
tunnel for that road ... on which you are
standing, still exists but is covered by water.
Early mining activity brought many prospectors to this canyo
Every little flat spot served as a home for hopeful miners.
Prospecting continues in this area but very little ore is take
out.
A route for a railroad was once surveyed down this canyon.
PAYETTE National Forest

Fig. 12. Impact on historical and scenic areas. Black Point is both of scenic and historic interest. The sign relates items of historic interest, now flooded. (K. E. Hungerford Photograph, December 13, 1969)



3. Appaloosa Dam Site and the Dug Bar area. Shown here is the "Chief Joseph Crossing" area which has historical and archaelogical significance. The extent of flooding by both High Mountain Sheep Reservoir and Low Mountain Sheep Reservoir can be seen. (U.S. Forest Service photo)

The upper elevations have gentler slopes, more precipitation and predominantly forest vegetation. These areas provide water for ranches and recreation sites in the lower canyon and are more stable than the grasslands, although still capable of erosion when disturbed.

Dam development would directly affect reservoir, road and trail erosion, and indirectly increase fire hazard. The large size and extensive variation in levels of the proposed reservoirs would create a zone of erosion along their shores. Access roads and trails would also contribute to erosion, particularly on the steeper grassland areas. Potentially the greatest erosion hazard would come from greatly increased human visitation to the area due to the development of improved access and recreation sites. Fire hazard on the grassland areas is high in late summer and fall, especially on areas dominated by cheatgrass and other annuals. The history of previous fires shows that, once they start up the steep canyon slopes, they readily spread into the forested areas above. Experience in other dry areas with steep watersheds has also shown the high erosion with flood potential of recently burned cheatgrass ranges.

PROBLEM ORIGINS

The economic, social and political forces in the High Mountain Sheep controversy have been described in the "Recitation of Facts" above. The legal framework within which the controversy originates is discussed below.

The Federal Power Commission is authorized by Federal Power Act Section 4(e) to issue licenses to private companies, states and municipalities for the construction, operation and maintenance of hydroelectric projects on streams such as the Middle Snake River (1), Section 7 (b) of the Act, however, limits this authority by providing that "whenever, in the judgment of the Commission, the development of any water resources for public purposes should be undertaken by the United States itself, the Commission shall not approve any application for any project affecting such development...."(2). In reviewing the Commission's issuance of a license to PNPC for High Mountain Sheep, the United States Supreme Court found that the relative merits of federal and non-federal development under section 7(b) had not been adequately explored by the Commission and remanded the case for further consideration of that question (3).

The licensing authority of the Commission under section 4(e) is further restricted by section 10(a), which prohibits issuance of a license unless:

> "the project adopted . . . shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes . . . .(4).

> "Beyond the question of federal versus non-federal development, said the Court, are the issues under section 10(a) of 'whether deferral of construction would be more in the public interest than immediate construction and whether preservation of the reaches of the river affected would be more desirable and in the public interest than the proposed development . . . .'" (5)

Without passing on the merits of these issues, the Court remanded the case for further consideration of them. It cautioned that the inquiry should not stop with the questions of whether the proponents of the project would be able to put the hydroelectric power to use and whether there is regional need for the additional power.

The test is whether the project will be in the public interest and that determination can be made only after an exploration of all issues relevant to the "public interest," including future power demand and supply, alternate sources of power, and the public interest in preserving reaches of wild rivers and wilderness areas, the preservation of anadromous fish for commercial and recreational purposes, and the protection of wildlife. (6).

The Supreme Court's approach was similar to that of the Second Circuit Court of Appeals in another land mark case, Scenic Hudson Preservation Conference v. FPC, (24) in which a Commission order granting a license for a Consolidated Edison Company pumped storage plant was reversed because of inadequate consideration of environmental factors.

In remanding that case for further hearings, the Court of Appeals stated:

> "In this case, as in many others, the Commission has claimed to be the representative of the public interest. This role does not permit it to act as an umpire blandly calling balls and strikes for adversaries appearing before it; the right of the public must receive active and affirmative protection at the hands of the Commission." (25)

Since the Salmon River, from its confluence with the Snake up to the town of North Fork, has been designated for potential addition to the national wild and scenic rivers system under the Wild and Scenic Rivers Act of 1968, the Commission is prohibited from licensing any project on the Snake which will invade that segment of the Salmon River area or diminish the scenic, recreational, and fish and wildlife values present in the area as of October 2, 1968. (7) The prohibition is to last at least until October 2, 1973, unless it is earlier concluded by the Secretaries of Interior and Agriculture that this segment of the river should not be included in the national wild and scenic rivers system.

When the Commission receives a license application for construction of a dam such as High Mountain Sheep, it may either: (1) approve the application, (2) deny it, or (3) approve it after requiring such modifications as necessary to result in a project best adapted to the section 10(a) purposes (8). In making a decision, the Commission is directed to explore "all issues relevant to the 'public interest.'"

The Commission received data pertaining to the environmental impact of a proposed project and alternative courses of action to mitigate or avoid environmental problems from several sources. The first source of such data is the applicant. An applicant for a license is required to file a number of exhibits with the Commission. Under current regulations, which have been revised since PNPC's 1958 application for High Mountain Sheep and WPPSS's competing application in 1960, the following are among the exhibits required: Exhibit H showing minimum flow proposed during the recreation season, effect on water quality, and, to the extent possible, a description of any proposed use of the project for conservation and utilization in the public interest; (9) Exhibit R showing a proposed plan for full public utilization of project waters and adjacent lands for recreational purposes so far as consistent with operation of the project; (10) and Exhibit S showing the effect of the project on fish and wildlife resources and proposals for measures considered necessary to conserve and, if practicable, to enhance fish and wildlife resources (to be based on studies made in consultation with the U. S. Fish and Wildlife Service, Department of the Interior, and appropriate state fish and wildlife agencies). (11) On July 29, 1969, the Commission proposed a new regulation requiring an Exhibit V showing steps to protect and develop the natural, historic and scenic values and resources of the project area (to be based upon consultation with federal, state and local agencies or organizations and individuals having an interest in these values (12).

The second source of data is the Commission staff, which typically evaluates an applicant's plans and the likely effect of the project on fish and wildlife (13). It has been suggested that the staff would be more effective in this role if its Section of Recreation, Fish and Wildlife were expanded in size and provided with more funds.

The third source of data is other governmental agencies. When the Commission receives an application for a project like High Mountain Sheep, the Fish and Wildlife Coordination Act requires it to consult with the United States Fish and Wildlife Service, the Department of the Interior, and the Wildlife resources agencies of the states involved, "with a view to the conservation of wildlife resources by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development." (15) The Water Resources Planning Act of 1965 created a Water Resources Council, composed of the Secretaries of Interior, Agriculture, Army, and Health, Education and Welfare and the Chairman of the Federal Power Commission (16). The Federal Power Commission now refers license applications for hydroelectric projects to the Council for review and advice (17). In addition, the Secretary of the Interior may intervene as a party to the proceedings upon a license application in appropriate cases. In remanding the High Mountain Sheep case, the Court indicated that an order of the Commission allowing partial intervention in the proceedings by the Secretary of the Interior should be amended to allow full intervention (18). Finally, the Commission may seek expert witnesses from other federal agencies, such as the Atomic Energy Commission (19). The Commission has permitted intervention in the High Mountain Sheep proceedings by such state agencies as the Idaho Fish and Game Commission, the Fish Commission of Oregon, and the Oregon State Game Commission.

The final potential source of data is the interested public. The Federal Power Act allows "any interested State, State commission,... or any...person whose participation... may be in the public interest" to intervene as a party in any proceedings before the Commission (20). The Commission has been liberal in allowing intervention in the High Mountain Sheep controversy by organizations representing various segments of the public, as revealed by a partial list of intervenors in the initial hearing on the competing applications of PNPC and WPPSS: Alaska Fishermen's Union, Chinook and Cowlitz Indian Nations, Columbia River Salmon and Tuna Packers Association, Idaho Wildlife Federation, National Hell's Canyon Association, Inc., and Oregon State Water Resources Board (21).

Before an interested non-power organization can intervene, it of course must know of the existence of a proceeding. The High Mountain Sheep controversy has been well publicized, at least during its more recent stages, but the same is not true of many projects. A recent study suggests the Commission ought to give better notice of the filing of a license application than the statute-required publication in a local newspaper once a week for four weeks and publication in the Federal Register (22), and ought to be more responsive to public inquiries about the right to take part in proceedings and how to go about it (23).

ENVIRONMENTAL CONSIDERATIONS

1. Special Studies

Many special studies have been completed to evaluate the environmental impact of the Middle Snake reservoir projects. Most of these follow procedures specified by the Coordination Act or the licensing authority as outlined in part 3 above. Generally such studies are produced as testimony or received by the Commission. However, many pieces of evidence are not forcefully presented at hearings or are not used until presented finally by citizen groups or other intervenors to the hearings. There seems to be a grave procedural block to full consideration of environmental issues relevant to the public interest.

The U. S. Forest Service has made impact studies of the Middle Snake (1). The studies are summarized in a letter to the F.P.C. from Secretary of Agriculture Orville L Freeman, dated November, 1968, in which he specifically recommends that a dam at High Mountain Sheep location should not be built (2).

The U. S. Department of the Interior completed a Resource Study of the Middle Snake in 1968 (3). This includes reports from eight agencies of the Department. Those touching specifically on the environmental impact are the reports of the Fish and Wildlife Service, the Federal Water Pollution Control Administration, the Bureau of Outdoor Recreation, Bureau of Land Management and National Park Service. Most of these are cited in this report. Perhaps it could not be expected that the Secretary of the Interior or agencies under his jurisdiction could recommend against impoundment of the Middle Snake when the Department of the Interior had a request before the Commission for construction. However, the Secretary has more recently urged a moratorium (4).

It is not at all clear that these studies have been used in the decision-making process. Many agencies do not seem to have authority or budgeting to examine adequately the environmental impact nor have they been granted sufficient time, in the judgment of the writers. The Commission staff is handicapped in a similar way as mentioned in part three above. Perhaps the Supreme Court decision to remand the case for further consideration is the first clear indication that "public interest" includes such environmental issues as "wild rivers, wilderness areas, recreational fisheries and wildlife protection."

m. Alternatives

(1) Construction Proposals

Five different plans for dam construction are now being considered by the Federal Power Commission. (Tables 1, 5 & 6 and Figures 1, 6). Each of the plans anticipates more or less full development of the river from Asotin pool to the present Hell's Canyon Dam (Fig. 6). The five alternative construction proposals can be ranked in order of the total environmental impact. This can be only a generalized rating attempting to integrate all facets of the affected environment. They are listed as follows with the greatest impact as number 1.

a. High Mountain Sheep - China Gardens.
b. Pleasant Valley - Mountain Sheep - China Gardens.
c. Appaloosa-Mountain Sheep- China Gardens.
d. Appaloosa-Mountain Sheep
e. Pleasant Valley-Mountain Sheep

(2) The Moratorium Alternative

It has been proposed by Senators Church and Jordan of Idaho that a ten year moratorium on construction be in effect on the Middle Snake-Hell's Canyon area. Joint legislation was introduced into Congress in both the current and previous sessions. This alternative has the obvious advantage of a period for study of the environment and the potential impacts. Such much-needed studies will provide a necessary basis for the decision-making process.

Table 5. Recreation Facilities

ame	Viewpoint and Museum	Auto Parking	Boat Dock	Boat Ramp	Boat Transport	Swimmer's Float	Ski Float	Campsites - Access by Road	Campsites - Access by Boats	Tables & Grilles	Community Kitchen
igh Mtn. Sheep Dam Site	1				1						
orse Creek			1	1				21	9	30	1
ow Creek		1		1							
ry Creek			1			1		23		23	1
or Organizational Use			1			1		17		8	1
eek Creek			1					24		24	1
olf Creek			1			2	1	24		24	1
leasant Valley			1	1		1	1	24		24	1
ells Canyon				1							
LAN IV											
tn. Sheep Dam Site	1				1						
ug Bar			1	1				30		30	1
ry Creek									12	12	
eep Creek								12		12	
olf Creek									24	24	1
leasant Valley Dam Site	1			1	1						
leasant Valley ec. Site			2	2		2	2	50		50	1
ell's Canyon				1							
LAN V											
tn. Sheep Dam ite	1				1						
ppaloosa Dam ite	1		1		1						
ry Creek									12	12	
eep Creek								12		12	
olf Creek									24	24	1
leasant Valley	1		1	1							
ell's Canyon				1							

rom: Applicant's Joint Exhibit R-501-A. October, 1969.

Table 6. Generating capacity and water quality

	Gen. Units		Max. Gen. Capacity (mw)		Var. Level Intake	Oxygen-ation Planned
	Init.	Ult.	Init.	Ult.		
PLAN I						
China Gardens	2	5	250	625	No	No
High Mtn. Sheep	3	7	1720	4055	Yes	Yes
PLAN II						
China Gardens	2	5	280	700	No	No
Mtn. Sheep	2	4	400	800	No	No
Pleasant Valley	4	7	1920	3670	Yes	Yes
PLAN III						
China Gardens	2	5	280	700	No	No
Mtn. Sheep	2	4	160	320	No	No
Appaloosa	3	7	1200	2800	Yes	Yes
PLAN IV						
Mtn. Sheep	2	3	400	600	No	No
Pleasant Valley	4	7	1240	2170	Yes	Yes
PLAN V						
Mtn. Sheep	2	4	180	360	No	No
Appaloosa	4	6	1500	2250	Yes	Yes

FROM: Applicants' Joint Exhibit R-501-A. October, 1969.

(3) Alternatives to Hydro-Electric Power

Another alternative often suggested is the development of fossil fuel and nuclear energy to supply the power needs of the Pacific Northwest. Usually a permanent moratorium on dam construction in the Middle Snake River is tied to this concept. This alternative suggests that the environmental impact is so great, and the public values at stake are so large that they obviously outweigh any benefit-cost calculations of dollar value for power.

(4) Maximum Recreational Development Alternatives

An alternative suggested by the writer of this report, would include a permanent moratorium or injunction against dams in the Middle Snake River. This could probably be done after detailed study under the Wild and Scenic Rivers Act. It is further suggested that some of the power production at the Hell's Canyon dam be sacrificed to provide a more even flow of water in the Snake River through Hell's Canyon. This would restore the river to a stable, free-flowing state which would have many benefits to river recreation, and probably to fishery management. As a variation of this alternative a low-head re-regulating dam below Hell's Canyon dam may serve the same purpose.

(5) Procedural Alternative

It is evident that the public, federal and state land management agencies scientific groups, and others do not have sufficient information regarding construction proposals nor time to prepare testimony regarding the impact on the environment. It is suggested that each construction agency, including federal, state, private and specifically including the Corps of Engineers, be required by Congress to conduct public hearings, and publish construction proposals at least a year or two before the final step in the decision-making process. During this interval, the needed studies of the environment could be completed and available for inclusion in the final decision. If any agency were to make changes in construction details, such as raising or lowering water levels, the hearings and study interval should then be repeated.

CONCLUSIONS

The authors have made the following conclusions and value judgments on the basis of first-hand experience in the area and examination of scientific data:

1. The Hell's Canyon-Middle Snake area must be considered as a part of a larger environmental complex. The Seven-Devils Mountains, the Wallowa Mountains, the important tributary streams must all be considered as well as the Snake River and the canyon itself. This is not always done, particularly by the F.P.C. under its licensing authority.

2. The Hell's Canyon is unique from many points of view, and if the maintainence of a quality environment is acceptable public land policy, there are many compelling reasons for postponing all impoundments indefinitely.

3. The high quality recreation potential of this area is directly related to the proper management and enhancement of fish and wildlife resources, the river canyon recreation source, the protection of the rather fragile ecosystem from fire and disturbances which will accelerate erosion, including even a mass influx of recreation seekers.

4. There is a shortage of land level suitable for recreation development, around the shoreline of the High Mountain Sheep pool. Intensive use of these areas will displace the pattern of game and livestock use, and create a severe fire control problem.

5. The water quality of the Snake River will be detrimentally affected by impoundments, and to such a degree that the remaining salmon runs in the Imnaha, Salmon, Grande Ronde and Clearwater may eventually be eliminated. Certain to be lost is the white sturgeon fishery. Other fishery resources will be reduced to varying degrees.

6. The Federal Power Commission through its licensing authority could require adequate environmental impact studies. Its decision was made on the narrow review of "public interest" in terms of the economic justification of power production. It remained for the Supreme Court to require reconsideration of the "public interest" in a broader sense including the environmental impact. It remains to be seen how the FPC authority will be used in this context.

LITERATURE CITED

Section 1 - Recitation of the Facts:

1. U. S. Department of the Interior, 1968. Department of the Interior Resource Study of the Middle Snake. April, 1968.
2. Freeman, Orville, L. 4(e) Letter from the Secretary of Agriculture to Federal Power Commission Commenting on Joint License Application for High Mountain Sheep Project. 2243/2273. November, 1968.
3. Hickel, Walter J. 1969. Interior Seeks Moratorium on Middle Snake River Development. Department of Interior News Release. August 11, 1969.

Section 2 - Environmental Impact:

1. Burt, W. V. Water Temperature forecasts for the Snake River below the proposed High Mountain Sheep dam. Part I. Water Research Associates, Corvallis, Oregon, 1964. 38 pp.
2. Falter, C. M. Unpublished data. College of Forestry, Wildlife and Range Science, University of Idaho, 1969.
3. Federal Water Pollution Control Agency. Water quality control and management - Snake River Basin. Federal Water Pollution Control Agency, Northwest Region, Portland, Oregon, 1968, 72 pp.
4. Federal Water Pollution Control Agency. Report of the committee on Water Quality Criteria. Report of the National Technical Advisory Committee to the Secretary of the Interior. April 1, 1968. Washington, D.C. 234 pp.
5. Gunsolus, R. T. Testimony before the Federal Power Commission, Project No. 2243/2273. Testimony submitted by the intervenors, Fish Commission of Oregon and Oregon State Game Commission, June, 1968.
6. Haas, J. B. Testimony before the Federal Power Commission, Project No. 2243/2273. Testimony submitted by the intervenors, Fish Commission of Oregon and Oregon State Game Commission, June, 1968.
7. Idaho Department of Fish and Game. Unpublished data on Oxbow and Hell's Canyon pools, McCall, Idaho, 1969.
8. Krenkel, P. A., Thackston, E. L., and Parker, F. L. 1968. The Influence of impoundments on waste assimilative capacity. In: Proceedings of the specialty conference on current research into the effects of reservoirs on water quality, January 1968. ASGE, Vanderbilt University, pp. 1 - 39.

9. Pitney, B. 1969. Statement at the informal hearing by the program committee, Oregon State Water Resources Board on the question of Middle Snake River Development. October 27, 1969.

10. United States Department of the Interior. 1969. Resource Report on the Middle Snake.

11. Fish, F. F., and Wagner, R. A. 1950. Oxygen block in the main stem Willamette River. Special Scientific Report in Fishery No. 41, Fish and Wildlife Service, U. S. Department of the Interior, 19 pp.

12. Bushnell, V. C. 1969. Eutrophication of American Falls Reservoir, Minidoka Project, Idaho. Interim report, Bureau of Reclamation, Boise, Idaho. 38 pp.

13. Bureau of Commercial Fisheries, and Bureau of Sport Fisheries and Wildlife. 1968. Middle Snake River Study, Idaho, Oregon and Washington, 37 pp. In Department of the Interior Resource Study of the Middle Snake.

14. U. S. Department of Agriculture, Forest Service. 1965 Impact Report. 95 pp.

15. U. S. Department of Agriculture, Forest Service, 1965. Big game mitigation study for High Mountain Sheep Dam Progress Report. Nez Perce and Payette National Forests. Project FPC 2243.

16. Schneider, P. W. 1965. An impact report evaluating the effects of High Mountain Sheep hydroelectric project on terrestrial wildlife resources in Oregon. Oregon State Game Commission. 24 pp. processed, 1 map.

17. U. S. Department of Agriculture, Forest Service. 1969. Middle Snake River, vibrant stream or placid pool. 32 minute slide lecture.

18. Ormiston, J. H. 1966. The food habits, habitat and movements of mountain quail in Idaho. M.S. thesis, University of Idaho. 39 pp.

19. Oregon State Game Commission. 1963 - 68. Annual Reports for 1963, 1964, 1965, 1966, 1967 and 1968. Oregon State Game Commission.

20. Idaho Power Company. "Fun Country." Guide to Recreation Facilities. Undated.

21. Leopold, Luna B. 1969. Landscape Esthetics, Natural History. October, 1969, pp. 37-44.

22. Leopold, Luna B. 1969. Quantitative comparison of some aesthetic factors among rivers. U. S. Department of the Interior, Geological Survey. Circular 620.

23. Frome, Michael. 1969. Must this be lost to the sight of man? Field and Stream. July.

24. Craighead, F. C., Jr. 1968. Testimony for the Federation of Western Outdoor Clubs. The Idaho Alpine Club. The Sierra Club. To the Federal Power Commission.

25. Bureau of Outdoor Recreation, 1968. Reconnaisance Report on Recreation Aspects of Alternative Water Resource Developments. In Department of the Interior Resource Study of the Middle Snake.

26. Freeman, Orville L. 1968. 4(e) Letter from the Secretary of Agriculture to Federal Power Commission Commenting on Joint License Application for High Mountain Sheep Project. 2243/2273. November, 1968.

27. Evans, E. Brock, 1968. Letter to the Hon. William C. Long, FPC, Washington re: Projects 2243, 2273, June 27, 1968.

28. Holubetz, Terry. 1970. Quoted in Lewiston Tribune, January 17, 1970, p 9. "Chapter Formed to Prevent Additional Snake Dams."

29. Evans, Gary R. 1967. Ecology of Aristida longiseta in north central Idaho. M.S. thesis. University of Idaho. 69 p.

30. Campbell, John D. 1962. Grasslands of the Snake River drainage in northern Idaho and adjacent Washington. M.S. thesis, University of Idaho. 86 p.

31. Hitchcock, C. L., a Cronquist and M. Ownbey. 1955. Vascular plants of the Pacific Northwest. University of Washington Press, Seattle. Vols. 1-5.

32. Daubenmire, R. F. and Jean Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Wash. Agr. Exp. Sta., Tech. Bull. 60. 104 p. (see p. 26-27)

Section 3 - Problem Origins

1. 16 U.S.C. §797(e)(1964)

2. 16 U.S.C. §800(b)(1964)

3. Udall v. FPC, 387 U.S. 428, 431-35 (1967)

4. 16 U.S.C. §803(a)(1964)

5. 347 U.S. at 449

6. 347 U.S. at 450

7. 16 U.S.C. §§1276(a) and 1278(b)(Supp. IV, 1965-68).

8. See 16 U.S.C. §802(a)(1964)

9. 34 Fed. Reg. 12274 (1969)

10. 18 C.F.R. §4.41 (1969).

11. *Id*.

12. 34 Fed. Reg. 12718 (1969).

13. Comment, *Of Birds, Bees and the FPC*, 77 *Yale L.J.* 117, 122 (1967)

14. *ID*. at 128-30.

15. 16 U.S.C. §662(a) (1964)

16. 42 U.S.C. §1962a (1964)

17. Poland, *Development of Recreational and Related Resources at Hydroelectric Projects Licensed by the Federal Power Commission*, 4 *Land & Water L. Rev.* 375, 383 (1969).

18. 347 U.S. at 339-40

19. Comment, *Of Birds, Bees and the FPC*, supra note 13, at 136-37.

20. 16 U.S.C. §825g(a)(1964)

21. Pacific Northwest Power Company, 31 F.P.C. 247, 248 (1964).

22. Comment, *Of Birds, Bees and the FPC*, *supra* note 13, at 131-32.

23. *Id*. at 134.

24. 354 F. 2d 608 (2d Cir. 1965), *cert. denied*, 384 U.S. 941 (1966).

25. *Id*. at 620.

Section 4

1. U. S. Department of Agriculture Forest Service, 1965. High Mountain Sheep Impact Report, 95 pp.

2. Freeman, Orville L. 1968. 4(e). Letter from the Secretary of Agriculture to Federal Power Commission Commenting on Joint License Application for High Mountain Sheep Project. 2243/2273. November, 1968.

3. U. S. Deparment of the Interior. Department of the Interior Resource Study of the Middle Snake. April, 1968.

4. Hickle, Walter J. 1969. Interior Seeks Moratorium on Middle Snake River Development. Department of Interior News Release. August 11, 1969.

CASE STUDY NO. XIV

BOUNDARY WATERS CANOE AREA, MINNESOTA

by

ROBERT REAM

Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

CHAPTER I

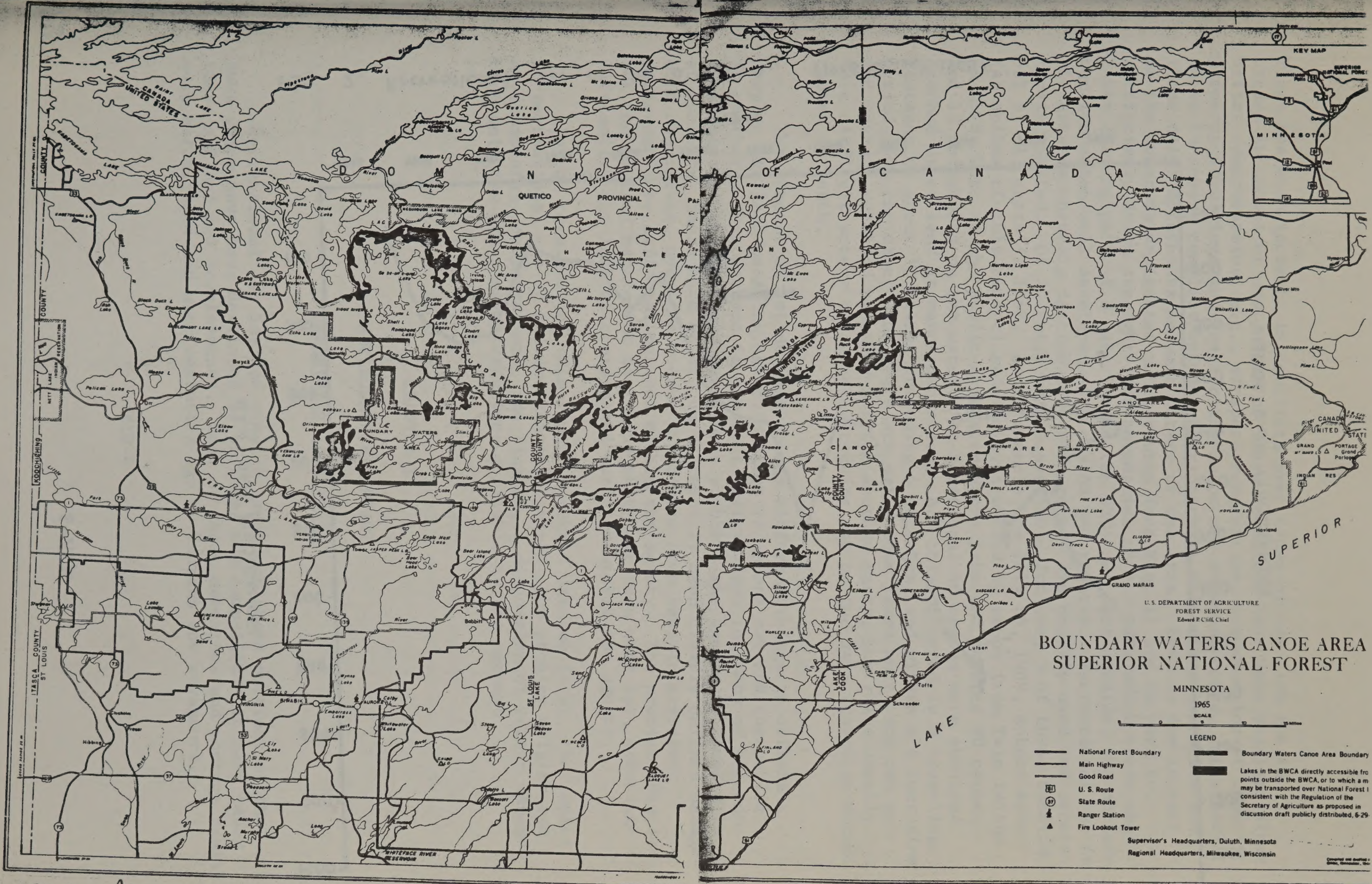
THE PROBLEM

Introduction

The million acre Boundary Waters Canoe Area (BWCA) is the second largest unit of the National Wilderness Preservation System and the only canoe wilderness. The adjoining Quetico Provincial Park in Canada is also about one million acres. Together these two areas provide approximately 2,000 miles of canoe routes. Water makes up 18% of the area of the BWCA and because of the irregular shapes and interconnecting nature of the lakes, a network of 1,200 miles of canoe routes is available. (Fig. 1) The BWCA makes up 1/3 of the Superior National Forest which was created by President Theodore Roosevelt's proclamation in 1909. Even before this time, there was evidence of general interest in the wilderness aspects of this northern lake country.

During the 61 years following creation of the Forest, the administrators have been faced with numerous controversies and management problems. Most of the controversies have centered on the management of the Forest's wilderness portions: those established under the Wilderness Act, or those possessing wilderness characteristics, *de facto* areas not protected by the Wilderness Act. Road building, construction of power dams, logging, resort development, use of aircraft, use of motorboats and snowmobiles, acquisition of private properties, boundary changes and preservation of natural communities of plants and animals have been subjects of heated controversies. Although each of these activities has had an impact on the wilderness qualities or wilderness capacity of the area, and each reflects public land management decisions, the purpose of this case study will be to consider only the impact of recreational use of the wilderness area in question. It will be important to keep in mind that the BWCA has been by far the most controversial unit of the National Wilderness Preservation System and a large portion of the Wilderness Act of 1964 consists of special considerations and exceptions for the BWCA.

Recreational problems in the area relate to amount of recreational use, conflicts in types of use and distribution of use. Canoeing as a mode of travel goes back to early Indians in the area and later to fur traders or voyageurs. Early in this century people began canoeing in the area for simple recreation or for exploring the wilderness. Since that time recreational use of this area has increased tremendously because of many factors: an increasing population; an increase in popularity and demand for this type of wilderness experience; a decrease in areas available for such an experience; improved road access to the area. Use estimates for the last 24 years are shown in Figure 2 but this figure should only be used to determine trends since the apparent fluctuations from year to year are related primarily to changes in methods of obtaining the values. This increase in wilderness use is not unique to the BWCA but is characteristic of the entire Wilderness System. For this reason many of the environmental impacts related to amount of use discussed in this report, although perhaps most critical in the BWCA, are not unique to this wilderness, but must be considered in other units of the System also.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Edward P. Cliff, Chief
BOUNDARY WATERS CANOE AREA
SUPERIOR NATIONAL FOREST
MINNESOTA
1965
SCALE
LEGEND
National Forest Boundary
Main Highway
Good Road
U. S. Route
State Route
Ranger Station
Fire Lookout Tower
Boundary Waters Canoe Area Boundary
Lakes in the BWCA directly accessible fro points outside the BWCA, or to which a m may be transported over National Forest l consistent with the Regulation of the Secretary of Agriculture as proposed in discussion draft publicly distributed, 6-29
Supervisor's Headquarters, Duluth, Minnesota
Regional Headquarters, Milwaukee, Wisconsin
KEY MAP
MINNESOTA
DOMINION OF CANADA
QUETICO PROVINCIAL PARK
CANADA
UNITED STATES
BOUNDARY WATERS CANOE AREA
LAKE SUPERIOR
GRAND MARAIS
ELY
VIRGINIA
BIWABIK
AURORA
Babbitt
Hibbing
Tofte
Lutsen
Schroeder
Hovland
GRAND PORTAGE INDIAN RES
KOOCHICHING COUNTY
ITASCA COUNTY
ST LOUIS COUNTY
LAKE COUNTY
COOK COUNTY
Vermilion Lake
Basswood Lake
Saganaga Lake
Crane Lake

Fig. 1. A

B

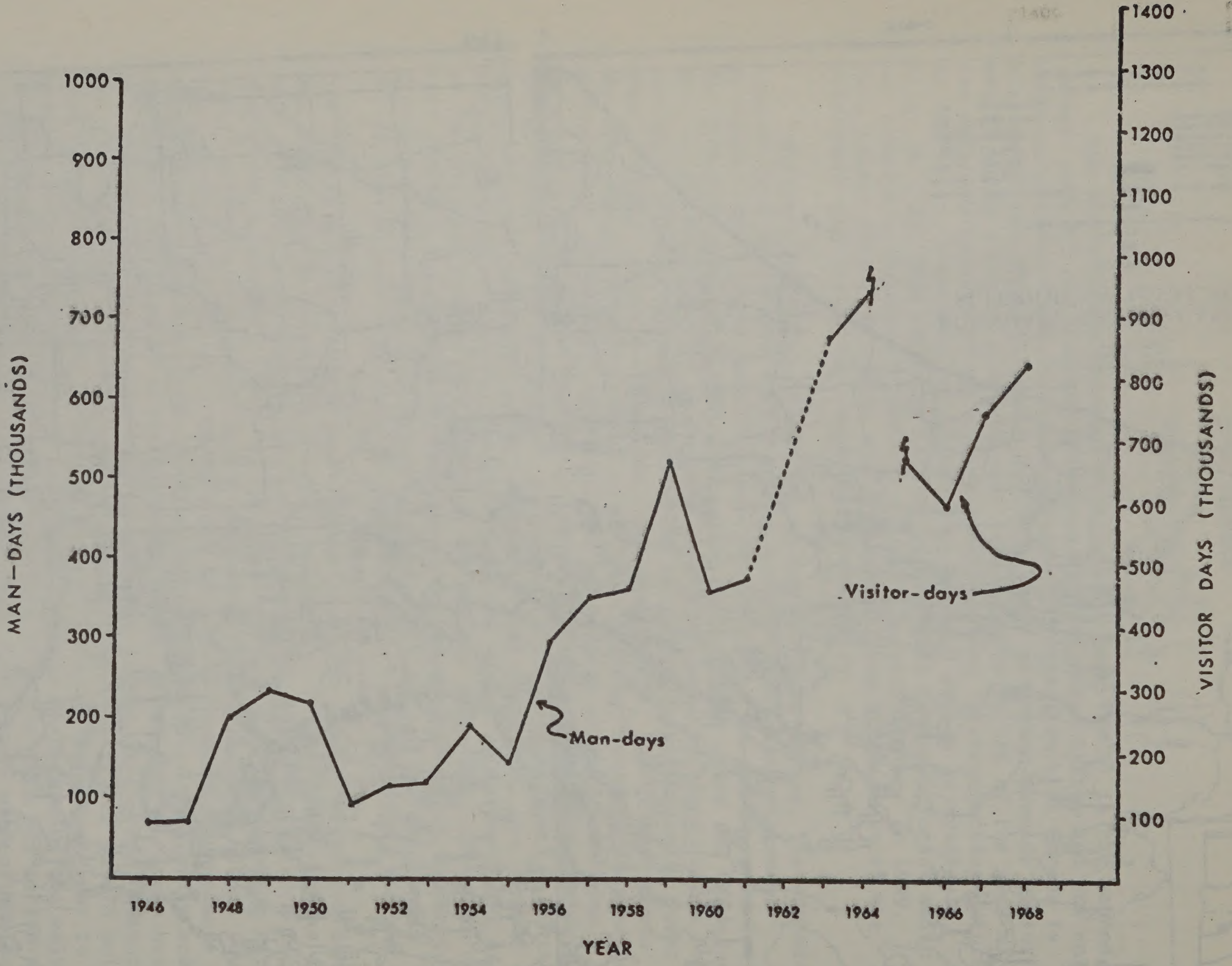


Fig. 2. Recreational use of the B.W.C.A., (1946 through 1968)

There has been increase in conflicts over types of use with the increase in amount of use. Some of these conflicts have been resolved after bitter controversies, e.g., airspace reservation, condemnation of resort property inholdings and restricting motor use on some routes. At present there is severe conflict between users seeking wilderness qualities and those using motorboats on most waters of the area. This is due in part to the numerous designated motor routes (see Fig. 1) and in part to artificially drawn straight-line boundaries of the BWCA which cross many lakes leaving part of a lake inside the BSCA and part outside, the outside portion often well developed with cabins and resorts. Recreational use in the area is unevenly distributed; some routes are heavily used and others rarely visited. Of 70 entry points available for use, 5 of these handled 63% of all users in 1968. As an example, on July 25, 1969, Robert Ream (an author of this report) and family traveled by canoe from Twin Island in Knife Lake to the public access on Moose Lake and counted 90 canoes and 12 motorboats on the water. An additional 40 canoes were observed beached or on land at canoe campsites. All this occurred in a traveling distance of about 15 miles, including 4 portages, and within a 6 hour time period. On the other hand there are still some lakes where one can go and spend a week and probably not see another party, but these usually have difficult access and usually require one or two days travel on motor routes to reach.

The concept of "wilderness" means different things to different people; the land managing agency defines it in one way and the public in another. This perhaps is the most basic reason for many of the controversies of the past and management problems the agency is faced with at present. There have never, until recently been clearly defined management objectives; even the recent directives have been interpreted differently by different persons within the agency. The problem then is not one of land management decisions that have been made but, more significantly, the lack of coordinated decision within the agency.

In the remainder of this report we shall examine first, the impact of recreational use on the environment, second, the problem origins and environmental considerations, and finally, a discussion of recent management policies and some alternatives available to the agency.

CHAPTER II

ENVIRONMENTAL IMPACT

Vegetation and Soils

Recreational use has had a major impact on those portions of the BWCA which have been developed as portages and campsites. In many cases these are not new developments. Some of these campsites and portage trails were established and used centuries ago by Indians and voyageurs.

Currently in the BWCA there are some 2,000 campsites of varying size and quality. Use is now sufficiently great to cause considerable change in the ecology of many of these sites. Research on the condition of BWCA campsites has shown that even light recreation use results in a loss of ground plant cover (5,9). Excessively heavy use can almost completely denude a site of all vegetation except trees. This loss of ground cover exposes the soil to compaction by foot traffic. Rain and snow melt water which cannot infiltrate the compacted soil runs over the surface carrying the soil with it. Such erosion and the mechanical wearing by campers' feet soon expose the root systems of the trees. These exposed roots are then susceptible to drought and injury. Consequently, as a result of the loss of ground vegetation, the tree cover on the site is endangered. In addition, loss of ground vegetation frequently lowers the quality of the campsite by creating dusty or muddy conditions.

A study in 1968 (9) of 119 randomly selected BWCA campsites disclosed that recreational use has resulted in an average increase in campsite soil compaction of 220%. Increased or even sustained use at current rates may severely change the vegetative cover of many sites. Soil compaction not only damages the existing vegetation but it may also preclude the establishment of new tree cover. Seedlings cannot survive on such a compacted surface.

The impact of this site damage may be more critical when one considers that nearly all of these site locations were chosen and developed by the users. Thus, we are witnessing the destruction of what may be the most highly desirable sites. Dependence on sites selected by users has frequently resulted in the use of fragile areas easily damaged.

User activities such as cutting firewood, tent poles and material for makeshift tables; maliciously or carelessly chopping and carving on living trees; peeling bark from birch trees; and poor location and carelessness with campfires have also contributed to the problems of poor campsite condition.

Water Quality

Recent investigations in the BWCA indicate that visitor use may be having an impact on the water quality of the lakes (2).

Most BWCA lakes are located in deep basins with steep sides. The watersheds have shallow soil covers over igneous bedrock. These geological conditions, combined with a short growing season, result in relatively infertile lake waters to which we attribute the clear, cold characteristics of the "northern lakes."

While natural fertilization is extremely slow and has progressed little in most BWCA lakes, artificially-caused "nutrient enrichment" is speeding the process in some lakes.

Artificial enrichment is occurring from two sources. Sewage treatment plants of municipalities and recreation developments on the periphery of the BWCA contribute enriched waters to river and lake systems which drain into the BWCA. Within the BWCA, visitors have become additional pollution sources. Human wastes, motorboat gas and oil and solid wastes (paper, food, etc.) all contribute nutrients to the wilderness lake system. It has been estimated that in 1967 BWCA visitors created an input of 8 tons of sodium chloride, 1 ton of phosphate and 12 tons of nitrogen (2). Outboard motor use contributed to the lakes an estimated 4 gallons of leaded gas for every 10 gallons used and considerable phosphate from motor oil. In 1969, it was estimated that some 120,000 visitors would also bring in 360,000 lbs. of non-burnable solid refuse, all of which contain both major and trace elements.

The impact of human use of the BWCA through nutrient enrichment is not pollution by toxic materials or the creation of gross deficiencies in oxygen which will harm water life. Rather, the impact will be most obvious as an increase in "aquatic nuisance" problems, i.e., algal growth. As algal blooms increase in frequency and severity, the widely acclaimed "clear northern lakes" will become less clear, the blue color will become a green, and the cold waters will be warmer.

Quality of the Wilderness Experience

The BWCA has several attributes which appeal to people seeking a wilderness experience. BWCA visitors are particularly attracted by such qualities as the "primitive," "isolated," "natural," and "undisturbed" character of the landscape (12,7,11); they express pleasure with the "uncrowded," "quiet," "peaceful" environment.

As early as 1960 and 1961, evidence was available that the level of use in at least some portions of the BWCA was sufficient to detract from the area's wilderness qualities. Lucas (1964) found that the most often-mentioned complaint of both canoe-trippers and auto campers in peripheral campgrounds was that the area was too crowded. Paddling canoeists were particularly sensitive to crowding and reported a loss in wilderness quality at a much lower level of use than did motor-boat users (Table 1).

Excessive numbers of people in a wilderness area can thus have a considerable impact on the quality of the wilderness experience.

Table 1

Opinions of crowding on lakes.

		Percent bothered by crowding		
Type of user	No.	Quite a bit	A little	Not bothered
Paddling canoeist	92	16	18	66
Motorized canoe	38	11	5	84
Motorboat	144	6	2	92

From Lucas, 1964.

Crowding is in direct conflict with such wilderness attributes as solitude, quiet, and remoteness.

The impact of recreational use on wilderness quality is not a matter of numbers alone. The type of visitor in the area also has an impact. For example, in the BWCA, paddling canoeists were highly upset by meeting motorboats or motorized canoes (Table 2). These types of users have direct impact on the solitude and quiet of the canoeists' wilderness experience (8,11). The Outdoor Recreation Resources Review Commission Study on Wilderness (1962) considered motor-use control as a major management problem in the BWCA.

Table 2

Reaction of three user types to meeting other types.

(From Lucas, 1964)

Kind & No. of Sample Groups Questioned	Kind of Group Met on Trip	Reaction of Sample Groups (in %) to Meeting		
		Disliked	Did Not Mind	Enjoyed
Paddling canoeists (62)	Paddling Canoeists	2	26	72
	Motor Canoeists	37	61	2
	Motorboaters	61	37	2
Motor canoeists (21)	Paddling Canoeists	0	62	38
	Motor Canoeists	0	90	10
	Motorboaters	62	38	0
Motorboaters (40)	Paddling Canoeists	0	55	45
	Motor Canoeists	3	72	25
	Motorboaters	3	72	25

The overall carrying capacity of the BWCA has been reduced by both crowding and conflicts between different types of users.

Another, but less studied impact of use on the quality of the wilderness experience is the reduced aesthetic appeal of campsites and portages where visitors have carelessly deposited litter, damaged vegetation or painted their initials on rocks. Certainly this sort of behavior affects the primitive, natural and undisturbed character of the wilderness landscape.

CHAPTER III

PROBLEM ORIGINS

Introduction

The controversies that have raged over the years concerning the BWCA have largely centered around the fact that many people have desired establishment of a wilderness preserve. As early as December 1, 1891, the Duluth News-Tribune expressed a desire for an extensive park reservation somewhere in northern Minnesota. Because of similar, widespread sentiment during the next 18 years, President Theodore Roosevelt created Superior National Forest in 1909 (35 stat. 2223). Lucas discusses the history of controversies and development of policies in the Superior National Forest and Quetico Provincial Park in considerable detail. Much of this is discussed and many of the documents are included in the BWCA Management Handbook (1969).

Early History - Prior to BWCA Name

A report to the President of the United States by the presidentially appointed Quetico-Superior Committee in December, 1953, discusses the history of controversies and actions prior to this time (Appendix Item 1). We shall discuss here only those points directly related to the problems of recreation and the area's "wilderness status." Apparently from the start, various persons interpreted the resource and its potential differently.

Road Building and the Carhart Report

Roads were the first source of disagreement over managing the Forest. The Forest Supervisor was anxious to build roads for administrative purposes and many local people supported "The Road-To-Every-Lake" plan. Apparently, someone in the Forest Service was concerned about the environmental impact, however, for Arthur Carhart, the Recreation Engineer from the Denver District Office was sent to the Superior in 1919 and 1921 to inspect, evaluate and propose a plan for its development (7). In his report he stated,

> The Superior is undoubtedly one of the few great canoe countries of the world . . . if it were attempted to make it an auto playground it would not only lose its claim as a canoe country, but enter into competition with all other automobile playgrounds. As a canoe country the Superior will have few, if any competitors.

The Assistant District Forester in Denver withdrew $53,000 which had been allotted for the road program, and a long conflict began (4). The plan Carhart proposed went directly against the Forest Supervisor's

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ideas. Consequently, his plan received little more attention (7). In 1923 the Forest Service called a conference in Duluth to try to settle the conflict. Representatives from differing groups voted against roads and in favor of Forest expansion. The road program was temporarily shelved, but in 1926 was presented again and approved by the District Forester. This led to another hearing in St. Paul which resulted in a deferring of the decision to Secretary of Agriculture, William Jardine.

The Jardine Policy

On September 17, 1926, Secretary Jardine signed a policy statement ". . . IN RELATION TO ROAD BUILDING AND RECREATIONAL USE OF THE SUPERIOR NATIONAL FOREST, MINNESOTA." At no time prior or since that statement has the Forest Service or Department of Agriculture so strongly endorsed wilderness for this area (See Appendix Item 2). The first three sentences of Jardine's policy are especially noteworthy. He also stated that not less than 1,000 square miles will be kept as wilderness recreation areas. However, before closing his statement he did justify extension of one road for fire protection and more ready access to the Fernberg Lookout Tower. Although this was an administrative road, for some reason public use was allowed and Jardine admitted "while this road will permit more ready access to the Kawishiwi water route at one additional point and will probably result in its use by more prople than the limited number who now traverse it, the extension will not impair the wilderness area program which the Department will apply on the big central portion of the Superior National Forest embracing some 250,000 acres. In terms of impact on the environment of the canoe wilderness, opening this road to the public has certainly been one of the most regrettable decisions made. At present about 30-40% of the wilderness users enter the BWCA from this section of road. Use conflicts were also created; Moose Lake, Lake One and Snowbank Lake are now well developed with resorts and cabins and concomitant heavy motor use, even though a large portion of each is in the BWCA. However, at the time this decision was made none of the land to the west or north, or the road itself was on the National Forest. By 1936, the entire central portion was added to the National Forest, and the Fernberg Road from then on was a non-wilderness peninsula deep inside the canoe area. One important note about this report is that the Secretary also approved the designation "Superior Wilderness Area" for the wilderness portions of the area. A 1928 map published by the Forest Service shows three separate pieces of land designated wilderness; these are not the same as the present three units of the BWCA. The first regulations on wilderness use (Regulation L-20) by the Secretary of Agriculture came in 1929. For some reason Regulation L-20 was not formally applied to this canoe wilderness until 1939--immediately before the new U-1 and U-2 classifications for wilderness replaced L-20.

Superior Roadless Area

On June 27, 1938, the Chief of the Forest Service approved a plan naming the previous Wilderness Areas, plus additional acquired lands, the "Superior Roadless Area." A copy of this report and policy statement for the roadless area are attached (Appendix Item 3). A year later this area was brought under the already existing Regulation L-20 (See Appendix Item 4) and the name changed to Superior Roadless Primitive

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Area. With establishment of the Roadless Area, a number of acquisitions were added making a large unit along the border and two lesser units somewhat similar in boundaries to the present three units.

Although the 1938 report is supposedly a rededication of the basic policy approved for the original "Wilderness Areas" in 1926, it has an entirely different tone (See paragraphs 3 and 4, Appendix Item 3). Timber management and harvest, understood as a "controlling economic consideration," was the dominant theme of this report. The following points deserve mention here.

1. The report states "No roads will be constructed except purely temporary roads incident to the removal of forest products." Many of those "temporary roads" are widely used by the public today, and many others inside the present BWCA can easily be traveled by car but are not open to the general public.

2. "The construction of logging railroads is permissible for the removal of forest products."

3. The report mentioned several uses that conflict with the primitive nature of the area.

   a. In discussing outboard motor use - "This type of transportation appears to be desired by a large percentage of those frequenting the Roadless Area, and, although it is undesirable from a primitive angle, it must necessarily be allowed." (p. 12 of report). Nowhere in the report is there any indication of what this percentage might be or why "it must necessarily be allowed." This was an obviously good time for the administration to nip a growing problem (outboard motors were just becoming reliable and common) in the bud, and they did recognize it as a problem, but they missed the opportunity.

   b. A similar problem is recognized with airplanes and unrestricted use is allowed. (See paragraph 1 on p. 13). An attempt is made to justify it on the basis of using local planes for fire control.

4. In discussing resort developments, p. 10 of the report says, "the interests and success of these pioneers have become a major objective of the administrative policies." Data of Lucas (7) and Lime (6) have shown that users from such peripheral developments (resorts and auto-campgrounds) are not really seeking a wilderness experience and could be satisfied with a similar outing outside the wilderness and in other parts of the Superior National Forest.

Although the U-1 and U-2 classifications were established in 1939, the same year this area finally came under L-20 classification, it took until 1948 for the Forest Service to create a special U-3 (a) category for it. In the meantime a vigorous program of timber harvest and road building along the southern portion of the Roadless Area was carried out. A railroad was built to Isabella Lake, 3 miles inside the Roadless Area, and a logging town called Forest Center sprang up there. A vast network of "temporary" roads were built north of Isabella Lake to harvest timber in the Roadless Area.

The 1948 Plan of Management

Because of these logging and road-building activities and because of pressures from outside groups to get the area under the U-Regulations, the Forest Service reclassified the 3 units as 3 Roadless Areas (Appendix Item 5). At the same time "relatively minor" boundary changes were made which, though minor in total acreage, excluded the well-developed Forest Center area and opened up a number of new access points and consequently motor use on lakes where no such use had been established (notably Kawishiwi and Isabella Lakes). The 1948 Plan of Management (Appendix Item 6), which was included with the request for reclassification, again emphasized the timber values and downgraded the wilderness qualities. There seems to have been a conscious effort to avoid the term wilderness in this document, and in one case a false statement is even made. "Among the early dedications was the establishment in 1926 of the Superior Primitive Area . . ." (p. 11, paragraph 4), which should be "Superior Wilderness Area" as indicated earlier and in the first sentence of Appendix Item 3. The 1948 plan recognizes that resort developments and airplane use conflicts with wilderness qualities, but no suggestions are made on controlling incompatible development. On use of motorboats and landing of airplanes, the report does state, "Both will be prohibited except in the areas where the employment of such facilities by the public has already become well established." However, no indication was made in the report or map about where such use was well established so it continued to become widely established. In 1949 though, an airspace reservation was enacted by Executive order 10092. In a test case in 1952, the courts upheld the validity of the order. Andrews (1) shows, however, that the airspace reservation was far more restrictive than the Forest Service wanted.

Name Change to Boundary Waters Canoe Area - 1958

By 1958, the absurdity of the term "Roadless Area" had become so embarrassing to the Forest Service who had riddled the area with "temporary roads" that they requested and received approval for a name change (appendix Item 7). They carefully avoided the term wilderness in the name ". . . because it has a technical connotation in connection with Regulation U-1 and this area is not a wilderness in that sense, even though it is very primitive in places." No other changes were made such as restricting conflicting uses, or identifying "well established" motor routes. The name change was made because, "It is confusing to many persons visiting this area to encounter roads and trucks within a so-called 'Roadless Area,' . . ." Conservationists have long been confused by the intentions of the agency in managing this area; this confusion, even today, has not diminished much. The 1958 memo was signed by present Chief Edward P. Cliff for Chief McArdle. In 1967, Cliff signed a memo to the Regional Forester which indicated "SUBJECT: Near-Natural Areas"; the memo referred to delegating authority for administration of the BWCA. The File No. 2320 is the file reference number generally used for wilderness and primitive areas. This represents an attitude which permeates much of the thinking within the Forest Service about BWCA. Terms like "semi-wilderness," "near-natural," "wilderness-like" and others have done little to reduce the credibility gap between the agency and the public.

CHAPTER IV

RECENT POLICIES AND POSSIBLE ALTERNATIVES

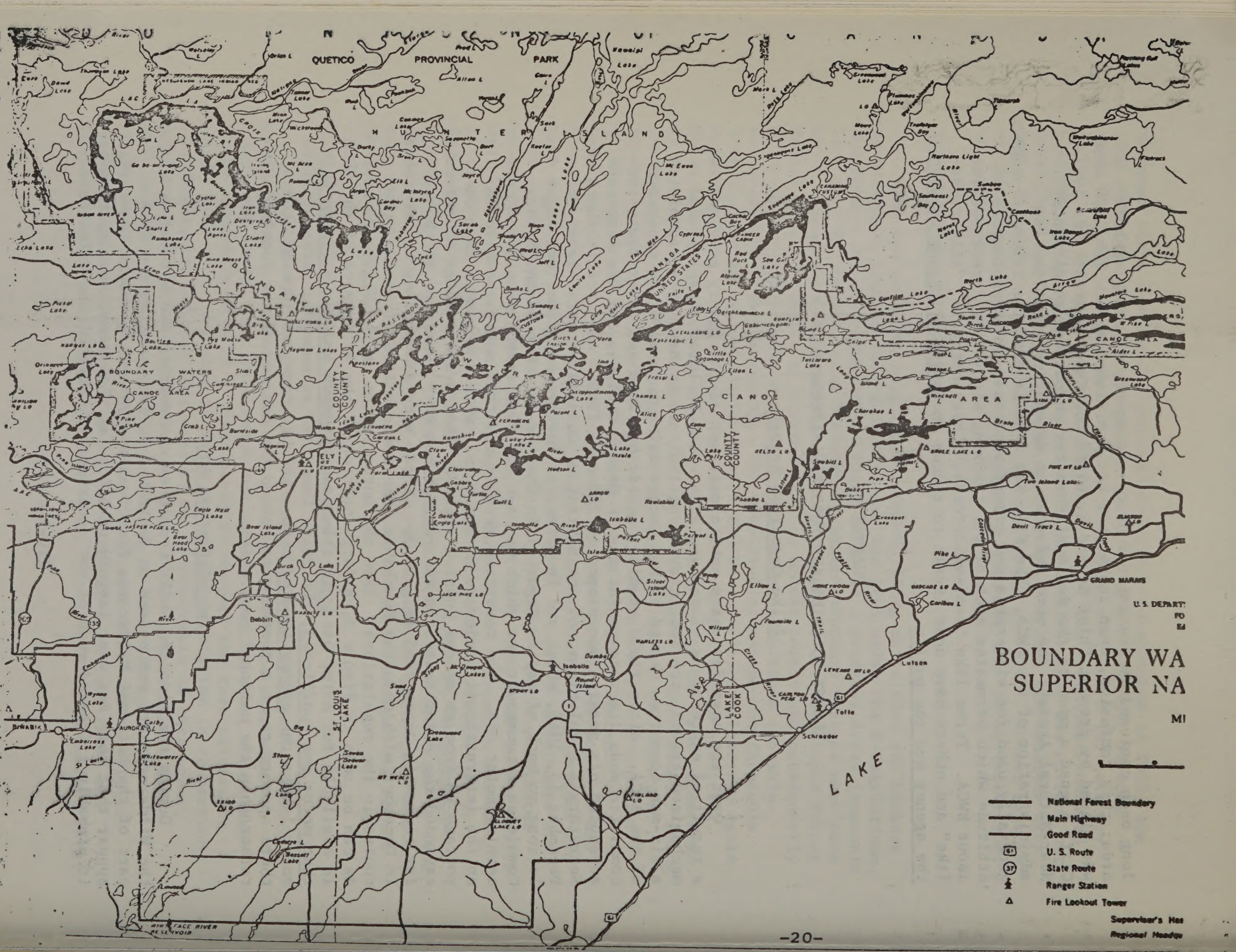
Selke Committee Report

Over the next few years public mistrust of the agency grew, and as a result of expressions of concern about road building, logging, and mechanized travel, the Secretary of Agriculture in May, 1964, appointed a six-man committee headed by Dr. George Selke to review the management of the BWCA. After field studies, public hearings and interviews, the committee made its recommendations in December, 1964, and the Secretary announced his general acceptance in January, 1965. As a result there were Secretary's Regulations and Administrative Guidelines established on December 15, 1965, which are in effect at the present time (see regulations on back of map in Figure 1 in Chapter I). One of the Selke Committee recommendations which was not followed is the regulation concerning motor use. The committee recommended that motors be allowed on the international border route and on all waters not more than one portage in from an access point. Instead, the Forest Service considerably expanded the motor routes in the regulations they submitted to the public for review in June, 1965 (Figure 3). These were accepted by the Secretary in December with only the Kekekabic Lake route omitted from the motor routes in the regulations. (See the motor routes on the Figure 1 map.) As can be seen in Figure 3, a large portion of the water area of the BWCA is available for motor use. In this case research had shown (Table 2) that motor use conflicted; the Selke Committee recommended rather limited motor lakes; the agency ignored both. In this case, as in many others, there appears to be a tendency to bow to the desires of the local people rather than the national population.

The Wilderness Act

During the time the Selke Committee was meeting and holding hearings, the Wilderness Act was passed on September 3, 1964, making the BWCA part of the National Wilderness Preservation System. Although it would appear that this Act went largely unnoticed at this time, anticipation of it probably triggered much of the controversy. Much of the Wilderness

Fig. 3


QUETICO PROVINCIAL PARK
HUNTER ISLAND
LAC LA CROIX
BASSWOOD LAKE
CANADA
UNITED STATES
BOUNDARY WATERS CANOE AREA
ELY
Winton
Babbitt
AURORA
Biwabik
Isabella
Lutsen
Tofte
Schroeder
GRAND MARAIS
LAKE
ST LOUIS COUNTY
LAKE COUNTY
COOK COUNTY
U.S. DEPART
BOUNDARY WA
SUPERIOR NA
MI
National Forest Boundary
Main Highway
Good Road
U.S. Route
State Route
Ranger Station
Fire Lookout Tower
Supervisor's Hea
Regional Headqu

Act was devoted to special exceptions for the BWCA and many specific regulations were to be made by the Secretary of Agriculture. Various interest groups were of course interested in what these regulations would be. Thus, although the BWCA became part of the National Wilderness Preservation System, the Act provides the Secretary with a great deal of discretion to manage the area as he believes proper.

Although the BWCA is now an official unit of the Wilderness System, recognition of this status is varied. Many Forest Service administrators still insist that the BWCA is "different," and although it is in the System it is "not really a wilderness." The local public reaction to the passage of the Wilderness Act indicated that many interested citizens believed that the BWCA was finally protected as a true wilderness area.

Research

With the exception of a few earlier studies, research in the BWCA began in a major way in 1960. At that time the U.S. Forest Service North Central Forest Experiment Station established a project to study wilderness use and users in the canoe country. More recently, the project has been broadened to include studies of campsite use and ecology of the biotic communities.

The results of this research appear to have had varying impact on the BWCA management program. The earliest studies documented the severe conflicts between paddling canoeists and motor users. It was quite clearly demonstrated that motor use was incompatible and resulted in a considerable reduction in carrying capacity. To date, no positive action has been taken to reduce these conflicts. In fact, designation of rather liberal motor-use zones has intensified the problems.

Similar responses have resulted regarding information on the problems of use concentration and the impact of constructing large auto campgrounds on the BWCA periphery.

Research on campsite deterioration and use has received much greater acceptance. A very progressive program of campsite closure, development and management has been developed by the Superior National Forest.

The disparity in management personnel's enthusiasm toward wilderness research perhaps results from the degree of each administrator's knowledge concerning land management and lack of understanding of the problems of people management.

Current Management

Thus far in this report we have been somewhat critical of the management of the area but this is the nature of our assignment. We have been examining problems of recreation and its impact. Historically these problems have not been handled very well. However, the agency is awakening to these problems, and, we feel, the outlook for the future is promising. In the last 4 years, and partly as a result of the Selke

Committee Report, the Forest has undergone a fairly aggressive program of wilderness management. Some of the highlights of this program are:

1. A Voyageur Visitor Center was built in Ely which provides an excellent opportunity for educating and informing wilderness users. Their program has been effective but could be improved. The main problem is that they have had four or five different men in charge of the Center, and all have been transferred to something else.

2. They have instituted a user registration system so they are able to get basic information on quantity and distribution of use in the BWCA.

3. A Soil Survey and Management Unit has been established which can provide recreation site capability estimates and has initiated rehabilitation studies.

4. A Water Quality Lab has been set up in Ely to monitor a series of lakes in the area in order to check on impact of recreation on water quality.

5. Campsite cleanup has been initiated by hiring summer crews to go around the area and clean up canoe campsites. Along with this, is a vigorous campaign to educate and encourage people to pack out all nonburnable refuse. Plastic litterbags are provided to users as they register; this has been very effective.

6. An advisory committee of 12 citizens, all Minnesotans and mostly local, has been appointed to participate in the decision-making in an advisory capacity. However, critics of past policy are notably lacking on this committee.

7. A BWCA Management Handbook (1969) has been written and approved which is a very comprehensive and useful document. This has been desperately needed for some time and should greatly improve management procedures and planning at the district level.

8. The Forest has tried prosecuting a number of persons violating the regulations; in several cases, however, the U.S. Commissioner has refused to hear them because of "insufficient cause."

9. Most of the cabins and resorts on Basswood Lake have been torn down and the Kawishiwi District Staff have done an excellent job of removing all traces of them and restoring the natural appearance. In this case the "wilderness capacity" has increased.

The Outlook

In spring and summer of 1969, a new Assistant Supervisor and Supervisor of the Forest were hired--both from western regions. It was evident on visiting the Forest (December 19 and 20) that this has had an impact. Problems are being looked at with a different slant and wilderness management was apparent. The Supervisor said that they must clearly define their management objectives and that these objectives should not be confused with the necessity for doing something.

One of the most pressing problems and one that the PLLRC might well ponder is that amount of use must be controlled. How do we do this in a public wilderness? It must be done before the wilderness qualities are completely lost. The Forest is thinking about this and talking about this perplexing problem. Implications of this problem again touch all wilderness areas in the System.

LITERATURE CITED

1. Andrews, R. P., 1954, Wilderness Sanctuary (No. 13 in the Inter-University Case program) University of Alabama Press.

2. Barton, M. A., 1969, Waters of the Canoe Country. Naturalist 20(1): 42-46.

3. BWCA Management Handbook, 1969, Management Handbook for Boundary Waters Canoe Area, Superior National Forest. Forest Service, U.S. Department of Agriculture, Duluth, Minnesota.

4. Carhart, A. H., 1955, Timber in Your Life. Philadelphia and New York, J. B. Lippincott Co.

5. Frissell, S. and D. Duncan, 1965, Campsite preference and deterioration in the Quetico Superior Canoe Country. Journal of Forestry 63:256-260.

6. Lime, D. W., 1969, Wilderness-like recreation opportunities adjacent to the Boundary Waters Canoe Area. Naturalist 20(1):36-41.

7. Lucas, R. C., 1962, The Quetico-Superior Area: recreational use in relation to capacity. Ph.D. Thesis, Department of Geography, University of Minnesota.

8. Lucas, R. C., 1964, The recreational capacity of the Quetico-Superior Area. Research Paper LS-15, Lake States Forest Experiment Station, St. Paul, Minnesota.

9. McCool, S. F., L. C. Merriam, and C. T. Cushwa, 1969, The Condition of Wilderness Campsites in the Boundary Waters Canoe Area. Minnesota Forestry Research Notes No. 202.

10. Outdoor Recreation Resources Review Commission, 1962, Wilderness and recreation--a report on resources, values, and problems. ORRRC, Study Report 3, Washington, D. C.

11. Survey Research Limited, 1968, A Study of Visitor Attitudes Towards Quetico Provincial Park. Project 528, The Parks Branch, Ontario Department of Lands and Forests.

12. Taves, M., W. Hathaway and G. Bultena, 1960, Canoe Country Vacationers. Miscellaneous Report 39, Agricultural Experiment Station, St. Paul, Minnesota.

APPENDIX ITEM 1

REPORT

to the

PRESIDENT

OF THE UNITED STATES

by the

QUETICO-SUPERIOR COMMITTEE

APPOINTED BY THE PRESIDENT

DECEMBER 1953

Acknowledgments

To the University of Minnesota Press and to Florence Page Jaques and Francis Lee Jaques for permission to use the superlative wilderness etchings in their books Canoe Country and Snowshoe Country.

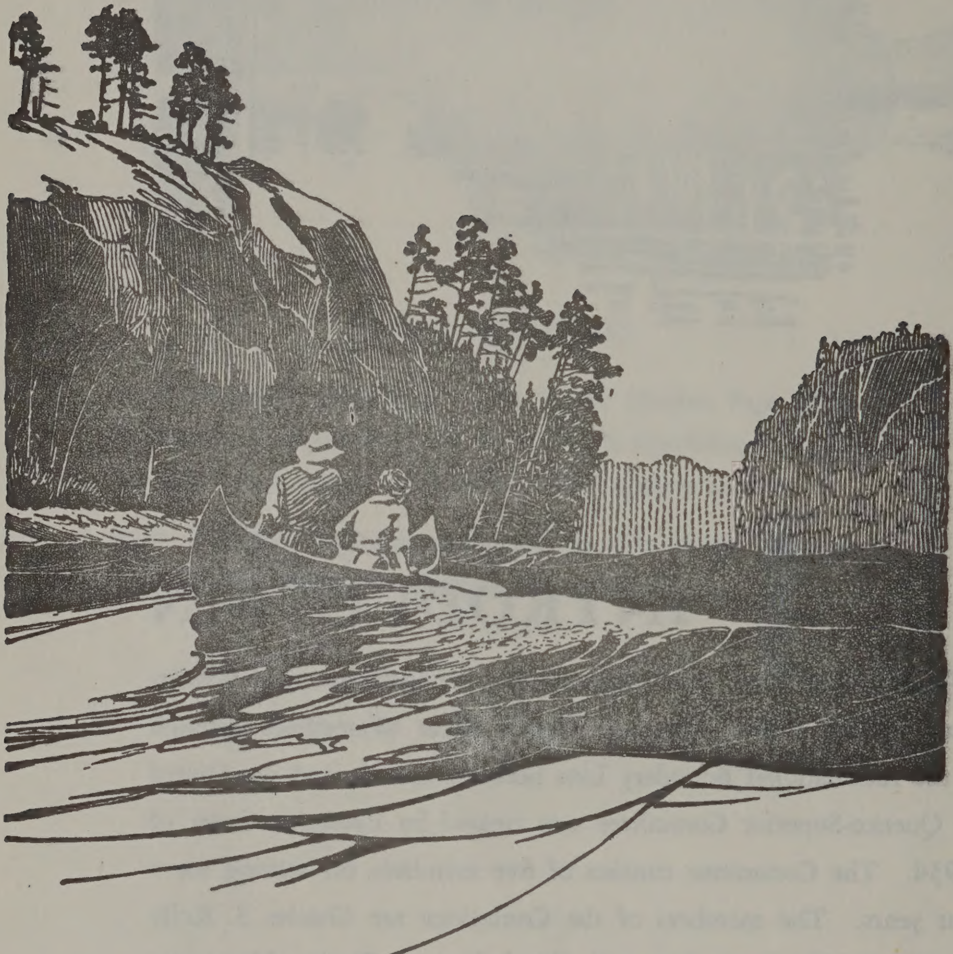
To the Minnesota Historical Society for the right to use the cover sketch from The Voyageur's Highway by Grace Lee Nute.

INTRODUCTION

IN FURTHERANCE of "a Program for the establishment of a Wilderness Sanctuary in the Rainy Lake and Pigeon River Watersheds through which runs the International Boundary Line between Canada and the United States," the Quetico-Superior Committee was created by Executive Order of June 30, 1934. The Committee consists of five members, all serving for a term of four years. The members of the Committee are Charles S. Kelly of Chicago, Illinois, Chairman, Ernest C. Oberholtzer of Ranier, Minnesota, Executive Secretary, and Dr. Olaus J. Murie of Moose, Wyoming, who were named by the President, Jay H. Price designated by the Secretary of Agriculture, and William Zimmerman, Jr. designated by the Secretary of Interior.

It is the duty of the Committee to consult, advise with and invoke the aid of the various Federal departments and agencies concerned "in the use and preservation of the said area in the public interest, and to make such recommendations from time to time as it deems proper."

A copy of the latest order is appended.



REPORT TO THE PRESIDENT

The Quetico-Superior Area extends from Rainy Lake to Lake Superior. Through it runs the Canadian border between Minnesota and Ontario. In this region are ten million acres of lakes, rivers, and forests encompassing the only international wilderness canoe country in mid-continent.

By 1900 other midwestern wilderness regions had largely disappeared. Though the forest and mineral resources of the area were then coming into production, and communities and settlements were expanding along its borders, this rugged non-agricultural land still held within its interior, a relatively untouched core of primitive lake country. With the advent of motor travel and increased accessibility to the periphery, the great public values of this undeveloped hinterland became recognized.

Today within a radius of 750 miles of the Quetico-Superior Area live forty-five million people who can use this unique region for their recreation. A thriving resort industry has developed along its fringes and each year thousands of canoeists travel the beautiful waterways of the adjacent wilderness interior.

Indicative of the national interest in the area, the public has rallied to its defense whenever the wilderness character of the canoe country has been threatened. The youth of America and family groups of all ages now appreciate its value and its preservation has become a personal matter to everyone.

Statement of Problem

The wilderness character of any area is easily destroyed and once lost may never return An unwise commercial development may in a short time cause changes that might take centuries to repair. With our expanding population, the opportunities for enjoying those qualities of solitude, remoteness, and removal from civilization inherent in this wild lake country, are becoming increasingly rare. This last island of midwestern wilderness therefore has great public value to our people.

The problem is how to preserve this value in the face of increasing commercial pressures. What is required is a plan of management which recognizing this value, will weigh commercial projects in the light of the greatest public interest. Until it can be proven that the area can best serve this interest in some other way, it should be retained and protected in its present primitive state.

The United States and Canadian wilderness regions are contiguous. Together they constitute a geographical unit of similar terrain interlaced by historic waterways. No plan of management is complete therefore unless it includes both sides of the international border.

While each country is faced with the immediate necessity of preventing the destruction of the wilderness character of its portion of the area by commercial developments, complete and permanent protection depends upon an understanding between the two countries as to an effective and rational plan of zoning and resource management for the entire Quetico-Superior Area.

In 1927 with the cooperation of Secretary of Agriculture Jardine and Canadian leaders, the Quetico-Superior Program was developed. It has the following objectives:

1. Protection of the wilderness character of the interior canoe country as well as the recreational values of lakes and streams of the entire area.
2. Administration of the forests under modern forestry practices but subject to the foregoing principle.
3. Agreement between the United States and Canada as to principles of resource management which each country shall apply to its own portion of the area.

The President's Quetico-Superior Committee

In response to the wide public interest and in support of this program, President Roosevelt established the Quetico-Superior Committee by Executive Order in June 1934.

This Executive Order directed the Committee to consult, advise with and invoke the aid of the Departments of State, Treasury, Agriculture, Interior, and Labor, the State of Minnesota, and all civic, scientific, and conservation organizations concerned, and to make such recommendations as the Committee deems proper.

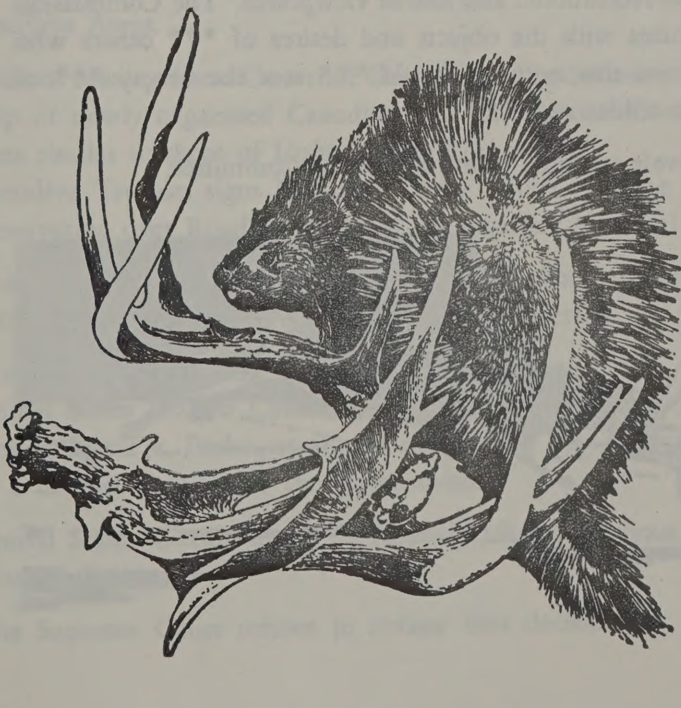
Since its creation the Committee has worked closely with the agencies mentioned and has carried on an intensive program of scientific and historical research, as well as education to further an appreciation of the area and its problems.

History of the Quetico-Superior Area

The following events highlight not only the threats to the wilderness character and recreational values of this unique region, but show the constructive actions taken by the government and other agencies for their protection. From these actions by Congress, the State of Minnesota, the Department of Agriculture, the Province of Ontario, and many civic organizations, there has emerged a consistent pattern of endorsement of the principles of the Quetico-Superior Program. Over the years, the preservation of the wilderness character of the undeveloped interior of the United States portion of the area has assumed the dignity and stature of a governmental purpose substantiated by laws, administrative decrees, Supreme Court action, and wide public support.

1909 President Theodore Roosevelt establishes the Superior National Forest and the Province of Ontario establishes Quetico Provincial Park adjacent to the Superior.

1912 Under authority of the Weeks Act, 1911, the boundaries of the



Superior National Forest are extended to include more of the wilderness canoe country.

1920 Proposed highways into the interior threaten wilderness character of the region.

1925 Proposal for water power development on border lakes is referred to The International Joint Commission.

1926 Initial wilderness reservations to be kept free of roads and private developments are made by the United States Forest Service.

1927 Quetico-Superior Program is developed for the protection of the area.

1929 American Legion and Canadian Legion endorse Quetico-Superior Program and urge that the area be dedicated to veterans of both countries as an International Peace Memorial.

1930 Shipstead-Newton-Nolan Act (Public Act No. 539, 71st Congress) protects shorelines of lakes and streams on federal lands within Superior National Forest Area.

1933 State of Minnesota passes similar legislation giving protection to state-owned shorelines within the Superior Area.
U. S. Forest Service greatly expands acquisition program of private lands within wilderness lake country.

1934 International Joint Commission recommends denial of 1925 application for water power development on border lakes, stating in its conclusions:

> "The boundary waters referred to in the Reference and the territory tributary thereto are of matchless scenic beauty and of inestimable value from the recreational and tourist viewpoints. The Commission fully sympathizes with the objects and desires of *** others who take the position that nothing should *** mar the beauty *** of this last great wilderness."***

President Roosevelt appoints Quetico-Superior Committee.

1939 U. S. Forest Service enlarges Roadless Areas of Superior National Forest to embrace a total of 1,038,743 acres of wilderness canoe country.

1940 Canadian government imposes shoreline cutting restrictions on wartime logging operations in Quetico Provincial Park.

1941 Wilderness is invaded by airplane fishing camps built on private lands.
U. S. Forest Service prohibits timber cutting on 362,000 acres adjacent to Quetico Provincial Park and the international border.

1944 Ontario Legion and Canadian Conservation Association endorse Quetico-Superior Program and urge that the proposed dedication as a memorial include veterans of World War II from both countries.

1945 The Department of Lands and Forests of Ontario joins in protection of wilderness by refusing to grant leases for private developments within Quetico Provincial Park.

1948 The Thye-Blatnik bill becomes law and authorizes an appropriation of $500,000 for acquisition of private lands and properties within Roadless Areas.

1949 Vincent Massey (now Governor General of Canada) accepts chairmanship of newly organized Canadian Quetico-Superior Committee with aims similar to those of United States Committee.
President Truman signs Executive Order 10092 creating an Airspace Reservation over Roadless Areas of the Superior National Forest.

1951 Executive Order 10092 becomes partially effective on January 1, prohibiting all flying except to developed properties.

1952 Executive Order 10092 becomes fully effective.
United States District Court upholds validity of the Order in case of United States v. Perko, et al., on the ground that it was in support of a definite purpose of the government.

1953 United States Circuit Court of Appeals affirms previous decision of District Court.

The Supreme Court refuses to review that decision.

Prospecting indicates presence of low grade deposits of copper, nickel, and cobalt in mineralized zone extending into Roadless Area. Mining interests request long term leases to explore and develop.

Summary

Within the last decade important iron deposits have been developed at Steep Rock, Ontario, just north of Quetico Provincial Park. Low grade deposits of copper, nickel, and cobalt are now being prospected on the American side. Other discoveries may be made in the future on either side of the border.

If mineral deposits of major value are found, the public welfare must be the deciding factor in their use and development. If it cannot be demonstrated that their commercial use is of greater public value than the wilderness that will be destroyed, such use should be prohibited. Should mining developments be warranted, then everything possible should be done to screen operations and to minimize the destruction of recreational values.

To date the United States has made substantial progress in the acquisition of private lands and in curbing threats to the Roadless Areas as well as to the surrounding resort regions.

On the Canadian side the forested lakelands are in public ownership. The government agencies responsible for their administration, strongly supported by public spirited citizens of the region, have shown foresight and determination in providing protection. A committee of the Northwest Associated Chambers of Commerce, the most influential civic body in that area, is now doing distinguished work in a zoning study and has already made constructive recommendations toward this goal. However, with increasing commercial demands, the threats to the Canadian wilderness values are also increasing.

Your Committee looks forward to closer international cooperation and understanding of mutual problems. We are aware that there must be no encroachment upon the sovereignty of either country, that the ultimate goal is agreement on broad principles with no change in jurisdiction.

If the unique public values of this area are to be perpetuated, the goals of the Quetico-Superior Program must be realized soon. Your Committee therefore has a deep sense of urgency to complete its work while these public values remain.

EXECUTIVE ORDER 9890

AMENDING EXECUTIVE ORDER NO. 6783 CREATING THE QUETICO-SUPERIOR COMMITTEE

WHEREAS the Quetico-Superior Committee was created by Executive Order No. 6783 of June 30, 1934, and its existence has been extended from time to time, last by Executive Order No. 9741 of June 25, 1946; and

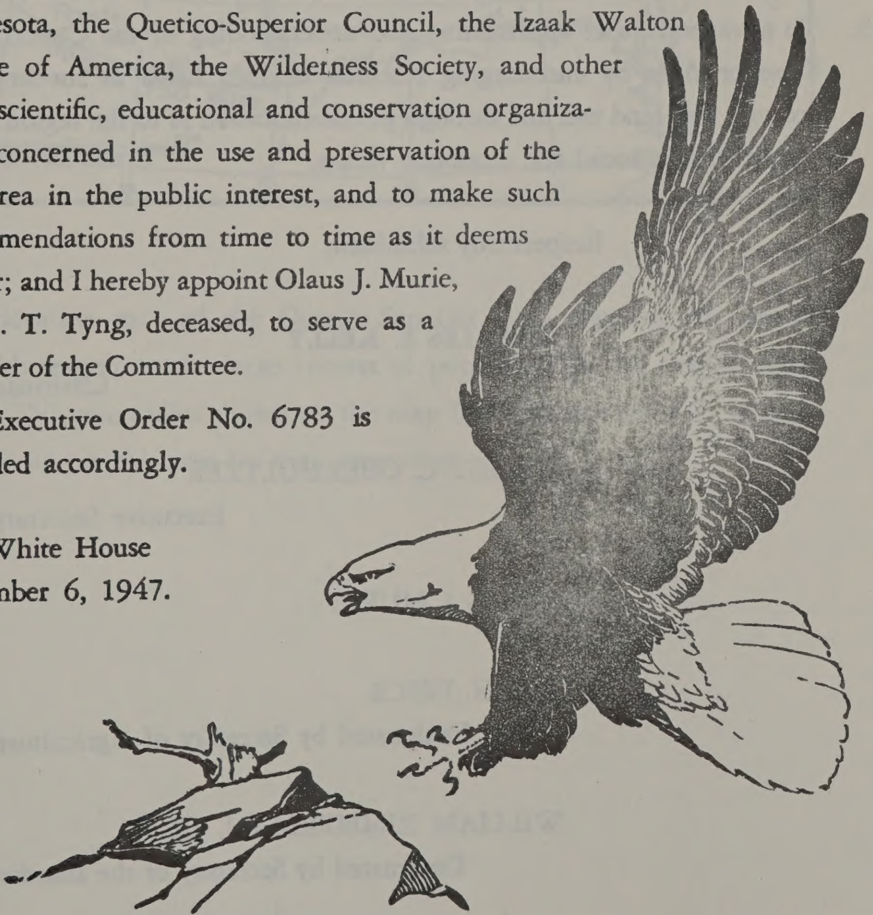
WHEREAS it is desirable to restate the authority of the Committee with respect to the wilderness sanctuary in the Rainy Lake and Pigeon River watersheds and to revise the list of agencies and organizations with which it is authorized to consult and advise; and

WHEREAS a vacancy exists in the membership of the Committee:

NOW, THEREFORE, by virtue of and pursuant to the authority vested in me as President of the United States, I hereby authorize the Quetico-Superior Committee to consult, advise with and invoke the aid of the Department of State, the Treasury Department, the Department of the Interior, the Department of Agriculture, the Department of Labor, the State of Minnesota, the Quetico-Superior Council, the Izaak Walton League of America, the Wilderness Society, and other civic, scientific, educational and conservation organizations concerned in the use and preservation of the said area in the public interest, and to make such recommendations from time to time as it deems proper; and I hereby appoint Olaus J. Murie, vice S. T. Tyng, deceased, to serve as a member of the Committee.

Executive Order No. 6783 is amended accordingly.

The White House
September 6, 1947.



Immediate Objectives

1. To acquire the remaining private lands within the Superior Roadless Areas.

   During the past six years with funds supplied by Congress and over $100,000 donated by the public, and through the medium of land exchange, much progress has been made. Private ownership is now less than 5% in the Roadless Areas. The final remnants, however, completely surrounded by federal lands, have great scarcity value as sites for commercial resorts. If they are not acquired swiftly, serious degeneration of wilderness values will result. Their acquisition is imperative.

2. To work toward the adoption of common principles of resource management by the United States and Canada.

   Only in this way will the entire Quetico-Superior Area have permanent protection. Then uniform administrative policies can cope intelligently with the inevitable pressures of the future.

3. To advance further appreciation and understanding of the Quetico-Superior Area by encouraging research in such fields as forestry, ecology, and land use, and through public education as to the region's history and its social and economic values.

Respectfully submitted,

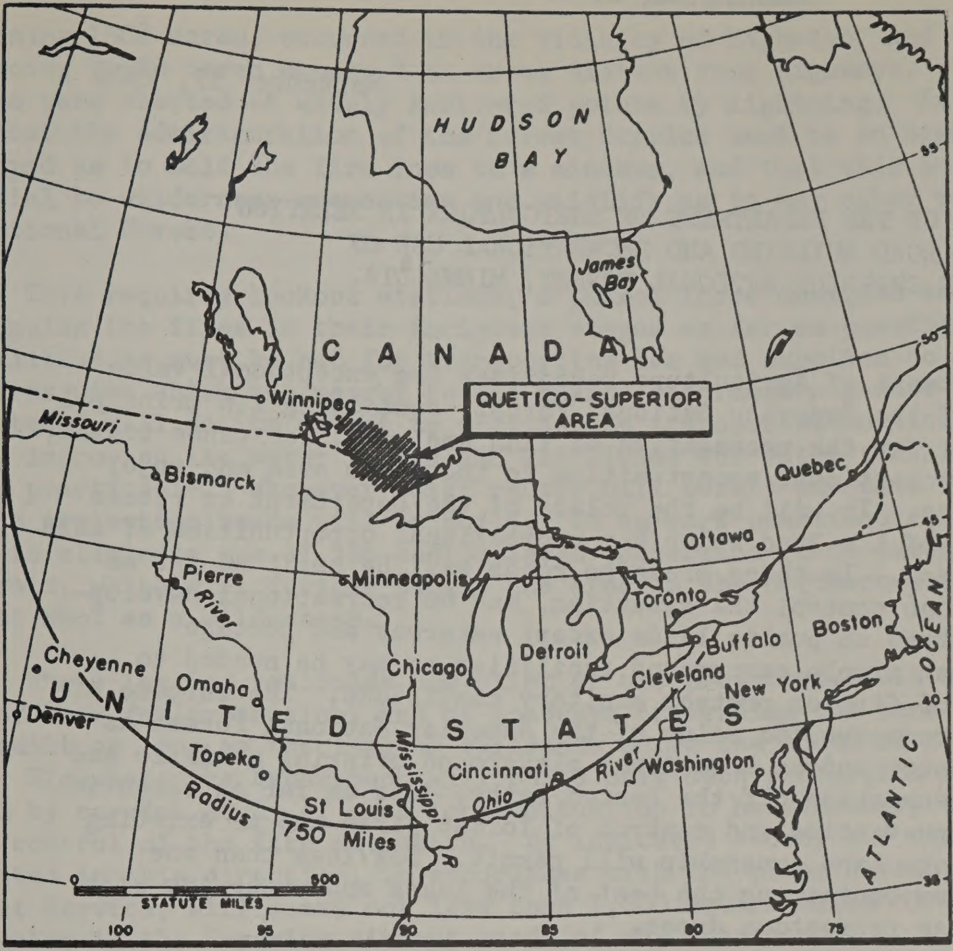
CHARLES S. KELLY
Chairman

ERNEST C. OBERHOLTZER
Executive Secretary

OLAUS J. MURIE

JAY H. PRICE
Designated by Secretary of Agriculture

WILLIAM ZIMMERMAN, JR.
Designated by Secretary of the Interior



Proximity location map of the Quetico-Superior Area showing its central location with respect to the large centers of population in the middle west. Within the 750 mile radius shown on the map live approximately 45 million people who can use this area for their recreation.

Printed in U. S. A.

APPENDIX ITEM 2

DEPARTMENT OF AGRICULTURE
Office of the Secretary

Washington, D. C.

September 17, 1926

THE POLICY OF THE DEPARTMENT OF AGRICULTURE IN RELATION TO ROAD BUILDING AND RECREATIONAL USE OF THE SUPERIOR NATIONAL FOREST, MINNESOTA.

The Department of Agriculture recognizes the exceptional value of large portions of the Superior National Forest, containing its principal lakes and waterways, for the propagation of fish and game, for canoe travel, and for affording recreational opportunities to those who seek and enjoy wilderness conditions. It will be the policy of the Department to retain as much as possible of the land which has recreational opportunities of this nature as a wilderness. In these areas no roads will be built as far as the Forest Service can control the situation, and no recreational developments will be permitted on public lands except waterway and portage improvements and such simple campground facilities as may be needed to prevent the escape of fire or protect sanitary conditions. The purpose of this program is to conserve the value of the Superior National Forest as a game and fish country and as a national playground offering a virile and wholesome form of recreation off the beaten paths,--just as far as essential facilities for the prevention and control of forest fires and as existing settlement and private land ownership will permit. Not less than one thousand square miles containing the best of the lakes and waterways will be kept as wilderness recreation areas.

On most of the Superior National Forest a valuable timber growth is gradually being restored. The production and utilization of timber, with scientific methods of cutting and a continuous yield of forest products, are fundamental purposes of the National Forests prescribed by law. A proper harvesting of the timber, as it becomes available for cutting and with the preservation of natural screens along lake shores, campgrounds and similar areas, is not inconsistent with preserving opportunities for wilderness recreation; and it will be the policy of the Department to utilize the timber produced on the Superior under careful methods of cutting that insure a continuous forest.

The two things most essential to carrying out the whole program for the Superior National Forest, including wilderness recreation, game conservation, and the restoration of valuable forest growth are (1) effective protection from fire, and (2) the consolidation of land ownership in the Government. The fire hazard to which the National Forest is subject has in some seasons been severe. During the last sixteen years there has been a total of 275 fires within and immediately outside the Forest boundaries. They burned over 37,646 acres of National Forest land. Fifty fires, during this period, were attributable to recreation or travel, of which twenty fires burning 1508 acres, occurred in the vicinity of highways, and thirty fires burning 7,150 acres occurred in areas distant from highways. Thirty-four fires were started at widely scattered points by lightning. It is obvious that the administration of the Forest Service must be so organized and equipped as to hold the fire loss to a minimum, and that this is just as essential to wilderness recreation and wildlife as to any other purposes of the National Forest.

This requires lookout stations, a patrol force designed to reach and extinguish the fires in their incipient stages as far as possible, and such facilities as must be had for transporting men and supplies to the larger fires with which the nearby Forest guards and rangers cannot cope. The Department will do its utmost to provide the transportation facilities needed by improving the water routes and facilities for water travel just as far as practicable. Wherever water routes will permit adequate fire control no protection roads will be built. It appears practicable, for example, to eliminate one of the contemplated protection roads extending to Lac La Croix, which will further extend the area in the northern portion of the Forest kept as a wilderness.

Where logging railroads now exist or are projected, full use will be made of them for protection; and no roadways traversing the same territory will be built as long as the logging railroads serve the needs of fire control. Elsewhere the Department will build only such protection roads as are found by careful study of each local situation to be necessary to afford adequate control of the fire situation. As indicated above, the utmost contemplated in this direction, in accordance with the plans developed by the Forest Service, will leave not less than 1,000 square miles of the best canoe country in the Superior without roads of any character.

In the National Forest as it now exists some 468,000 acres are not in public ownership. In the enlarged National Forest, approved for land purchases under the Clarke-McNary Act by the National Forest Reservation Commission, there are over 827,000 acres which are not in public ownership. Private lands are scattered through practically all of the National Forest including areas which the Department desires to retain for wilderness recreation. It must be fully recognized that the Government cannot control the use or development of these private lands, and that the wilderness recreation which we are seeking to foster can only be assured through public acquisition of the private holdings. This is, therefore, second only to the prevention of fire in accomplishing all of the purposes set out for the Superior National Forest, and will be pushed as rapidly as the resources available for land purchases permit.

The public roads now crossing portions of the Superior and some of the other roads that must be built for adequate protection -- all outside of the wilderness areas -- provide access to portions of the National Forest for motor travel and forms of recreation desired by people who are unable to take advantage of the wilderness areas. It is the belief of the Department that, after setting aside fully one-half of the National Forest for wilderness forms of recreation, provision should be made elsewhere for the roadside recreational facilities desired by many people. This will accomplish a balanced plan of public service, adapted to the needs of different groups of recreation seekers. In connection with the existing highways, therefore, and with some of the other roads that must be built for fire protection, public camping areas will be provided. Where there is need for resorts or summer homes, and they can be authorized after ample areas have been set aside for public campgrounds, it will be the policy of the Department to include such forms of recreation in its program.

The matters particularly considered at the hearing held at my request in St. Paul on September 3, by representatives of the Bureau of Public Roads and the Forest Service, dealt with the public highways within or adjacent to the National Forest on whose construction aid has been requested from the Department under the provisions of the Federal Highway Act of 1921. The purpose of this law is to assist the States and counties which contain National Forests in extending the public roads desired by them where such roads traverse National Forests or are of service to National Forests. It is part of the general policy adopted by Congress for recognizing the obligations of the Federal government as a large local land owner, but not a local taxpayer, in extending the regional improvements needed for State or county purposes. The situation of Lake and Cook Counties as presented at the hearing, with large areas of land in the National Forest and withheld from taxation, clearly indicates the merit of their applications for aid from the Department in so far as such aid is consistent with the terms of the law and with the general purposes of the National Forest. The Department of Agriculture must recognize its obligations as defined by the Federal Highway Act of 1921 in so far as public highways are proposed which are of service to the Forest.

The public highway which has been proposed from time to time, extending from Ely to Gunflint Lake, is outside of the boundaries of the Superior and traverses private lands which, on account primarily of mineral resources, will not be added to the National Forest. The major portion of this road, extending from the Fernberg Lookout to Gunflint Lake, has not been placed on the Forest Highway system and no project for its construction is now under consideration.

The 7-mile section connecting the present road eastward from Ely with the Fernberg Lookout, approximately one mile from the National Forest boundary, was previously placed upon the Forest Highway system because of the service which it was believed this road would render to the administration and protection of the Forest.

A fresh study of this situation discloses the following facts: An area of 150,000 acres of Government land, including most of the Kawishiwi waterway and one of the most valuable portions of the National Forest, must be protected from the Fernberg station. Twenty-four fires have occurred within this area during the last sixteen years, burning approximately 12,000 acres inside the National Forest. Twenty of these fires required the dispatch of men and supplies from outside sources. During the last five years eight additional fires, burning 18,000 acres, have occurred outside the Forest boundaries in territory reached from Fernberg. Several of these fires threatened the National Forest and had to be fought by Forest Service personnel.

For protection and administrative purposes, it is necessary to maintain one of the more important ranger headquarters at Fernberg, including family accommodations, for at least six months each year. The point can now be reached by an all-day trip, requiring 19 miles of canoe travel and five portages. It is not possible to materially reduce its inaccessibility by further waterway or portage improvements. In 1924 and 1926 the Forest Service personnel had to be stationed in this region and spring fires had to be fought before the waterways were open. The construction of the road would make the headquarters station accessible at practically all seasons of the year and during the months of fire hazard would place it within one and one-half hours travel time by motor from the National Forest headquarters.

Under these conditions, I cannot avoid the conclusion that the extension of the present road to Fernberg would be of material service to the National Forest and is in fact essential to its adequate protection. I have, therefore, approved the extension of the existing road seven miles to the Fernberg Lookout as a Forest highway project in accordance with the plan originally determined upon. While this road will permit more ready access to the Kawishiwi water route at one additional point and will probably result in its use by more people than the limited number who now traverse it, the extension will not impair the wilderness area program which the Department will apply on the big central portion of the Superior National Forest embracing some 250,000 acres.

The proposed road from Gunflint Lake to Sea Gull Lake would be an extension of the Forest highway system previously approved. This road would serve an isolated portion of the National Forest in certain respects, particularly in providing more rapid transportation of men and supplies in the event of large fires. It is, however, less urgent than the Fernberg Road from the fire protection standpoint. The Sea Gull-Gunflint extension will not, therefore, be included in the Forest highway system and no Federal funds will be contributed to its construction at this time.

In brief, the Department will adhere to the Forest highway system approved in April 1924 for the Superior National Forest, including the Fernberg extension but excluding the Sea Gull extension. The only addition which the Forest highway system, covering the public roads as distinct from purely protection roads, will thus add to the projects already built is the six mile extension of the present route extending eastward from Ely. The general plan for protection roads on the Superior will be carried out by the Forest Service as herein defined, with the dominating purpose of retaining as much as possible of the Forest area in a wilderness condition and constructing only such roads as mature judgment and study show to be essential to redeem the responsibility of the Department for protecting this valuable region from forest fires.

/s/W. M. Jardine

Secretary.

Shipstead-Newton-Nolan Law

(Public - No. 539 - 71st Congress)
(S. 2498)

An Act to promote the better protection and highest public use of lands of the United States and adjacent lands and waters in northern Minnesota for the production of forest products, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all public lands of the United States situated north of township 60 north in the Counties of Cook and Lake, State of Minnesota, including the natural shore lines of Lake Superior within such area; all public lands of the United States situated in that part of St. Louis County, State of Minnesota, lying north of a line beginning at the northeast corner of Township 63 north, Range 12 west, 4th P.M., thence westerly along the township line to the southwest corner of Township 64 north, Range 18 west, 4th P.M., thence northerly to the northwest corner of Township 65 north, Range 18 west, 4th P.M., thence westerly to the southwest corner, Township 66 north, Range 21 west, 4th P.M., thence northerly along the Township line to its intersection with the international boundary between the United States and the Dominion of Canada; all public lands of the United States on the shore lines of the lakes and streams forming the international boundary, so far as such lands lie within the areas heretofore described in this Act; all public lands of the United States in that part of the Superior National Forest located in Townships 61 and 62, Ranges 12 and 13 west, 4th P.M.; and all public lands of the United States on the shore lines of Burntside Lake and Lake Vermilion, State of Minnesota, are hereby withdrawn from all forms of entry or appropriation under the public land laws of the United States, subject to prior existing legal rights initiated under the public land laws, so long as such claims are maintained as required by the applicable law or laws and subject to such permits and licenses as may be granted or issued by the Department of Agriculture under laws or regulations generally applicable to national forests.

Sec. 2. That the principle of conserving the natural beauty of shore lines for recreational use shall apply to all Federal lands which border upon any boundary lake or stream contiguous to this area, or any other lake or stream within this area which is now or eventually to be in general use for boat or canoe travel, and that for the purpose of carrying out this principle logging of all such shores to a depth of four hundred feet from the natural water line is hereby forbidden, except as the Forest Service of the Department of Agriculture may see fit in particular instances to vary the distance for practical reasons: Provided, That in no case shall logging of any timber other than diseased, insect infested, dying, or dead be permitted closer to the natural shore line than two hundred feet, except where necessary to open areas for banking grounds, landings, and other uses connected with logging operations.

674

Sec. 3. That in order to preserve the shore lines, rapids, waterfalls, beaches, and other natural features of the region in an unmodified state of nature, no further alteration of the natural water level of any lake or stream within or bordering upon the designated area shall be authorized by any permit, license, lease, or other authorization granted by any official or commission of the United States, which will result in flooding lands of the United States within or immediately adjacent to the Superior National Forest, unless and until specific authority for granting such permit, license, lease, or other authorization shall have first been obtained by special Act from the Congress of the United States covering each such project: Provided, That nothing in this section shall be construed as interfering with the duties of the International Joint Commission created pursuant to the convention concerning the boundary waters between the United States and Canada and concluded between the United States and Great Britain on January 11, 1909, and action taken or to be taken in accordance with provisions of the convention protocol and agreement between the United States and Canada, which were signed at Washington on February 24, 1925, for the purpose of regulating the levels of the Lake of the Woods: Provided, That with the written approval and consent of the Forest Service of the Department of Agriculture, reservoirs not exceeding one hundred acres in area may be constructed and maintained for the transportation of logs or in connection with authorized recreational uses of national forest lands, and maximum water levels not higher than the normal high water mark may be maintained temporarily where essential strictly for logging purposes, in the streams between lakes by the construction and operation of small temporary dams: Provided, however, That nothing herein shall be construed to prevent the Secretary of Agriculture from listing for homestead entry under the provisions of the Act of June 11, 1906 (34 Stat. 233), any of the above-described lands found by him to be chiefly valuable for agriculture and not needed for public purposes: Provided further, That the provisions of this section shall not apply to any proposed development for water-power purposes for which an application for license was pending under the terms of the Federal Water Power Act on or before January 1, 1928.

Approved, July 10, 1930.

APPENDIX ITEM 3

Chief's Order Establishing Superior Roadless Area - 1939 and Superior, Little Indian Sioux and Caribou Roadless Areas - 1948

U
CLASSIFICATION, R-9, Superior
Wilderness Areas
Superior Roadless Primitive Area July 25, 1939.

Regional Forester,

Milwaukee, Wisconsin.

Dear Sir:

Reference is made to the report on the Superior Roadless Area dated at Duluth, Minnesota, November 15, 1937,[1] submitted by Forest Supervisor R. U. Harmon, and recommended by Regional Forester Lyle F. Watts January 8, 1938.

By virtue of the authority vested in me by Regulation L-20 of the Regulations of the Secretary of Agriculture relating to the occupancy, use, protection and administration of the National Forests, I do hereby designate as the Superior Roadless Primitive Area the lands described in the aforementioned report. Said lands shall hereafter be administered as a primitive area subject to the provisions of said regulations and the instructions thereunder.

Very truly yours,

C. M. GRANGER

ACTING CHIEF, FOREST SERVICE

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[1] A copy of this report is on file (1650 Contacts and Other) at the office of the Forest Supervisor, Duluth, Minnesota.

APPENDIX ITEM 4

23 - 2

THE SUPERIOR, LITTLE INDIAN SIOUX, AND CARIBOU ROADLESS AREAS
SUPERIOR NATIONAL FOREST
UNDER REGULATION U-3.

The Superior, Little Indian Sioux, and Caribou Roadless Areas, known collectively as the Superior Roadless Areas, constitute that portion of the Superior National Forest where, on account of the abundance of lakes and streams and the opportunity for canoe travel and other recreational pursuits under relatively primitive conditions, the policies and forms of management commonly employed on national forest land call for modification on a scale requiring the approval of the Secretary of Agriculture. The Secretary's Regulation U-3(a) pertaining to the management of the national forests, and formulated under the general authority of the Act of June 4, 1897 as amended, provides a means of formal action to that end.

Except for relatively minor changes in boundaries and for the designation of certain areas where timber use will be further restricted, the recommended action under Regulation U-3(a) merely reaffirms the existing status and plans of management originally developed and approved by the Acting Chief on July 25, 1939 under authority of Regulation L-20.

The general purpose of the plan of management is, without unnecessary restrictions on other uses including that of timber, to maintain the primitive character of the areas, particularly in the vicinity of lakes, streams and portages, and to prevent as far as possible the further intrusion of roads, aircraft, motor boats and other developments inharmonious with that aim.

There has been consultation with the President's Quetico-Superior Committee in the preparation of this report, particularly the administrative features of the problem.

The location and extent of the areas, the nature of the land and its resources, and the plans of management are described in the following pages of this report.[1]

Approval under Regulation U-3(a) of the establishment of the Superior Roadless Area is respectfully requested.

/s/Galen W. Pike

Submitted 1-6-48 (date) Galen W. Pike
Forest Supervisor

/s/Jay H. Price

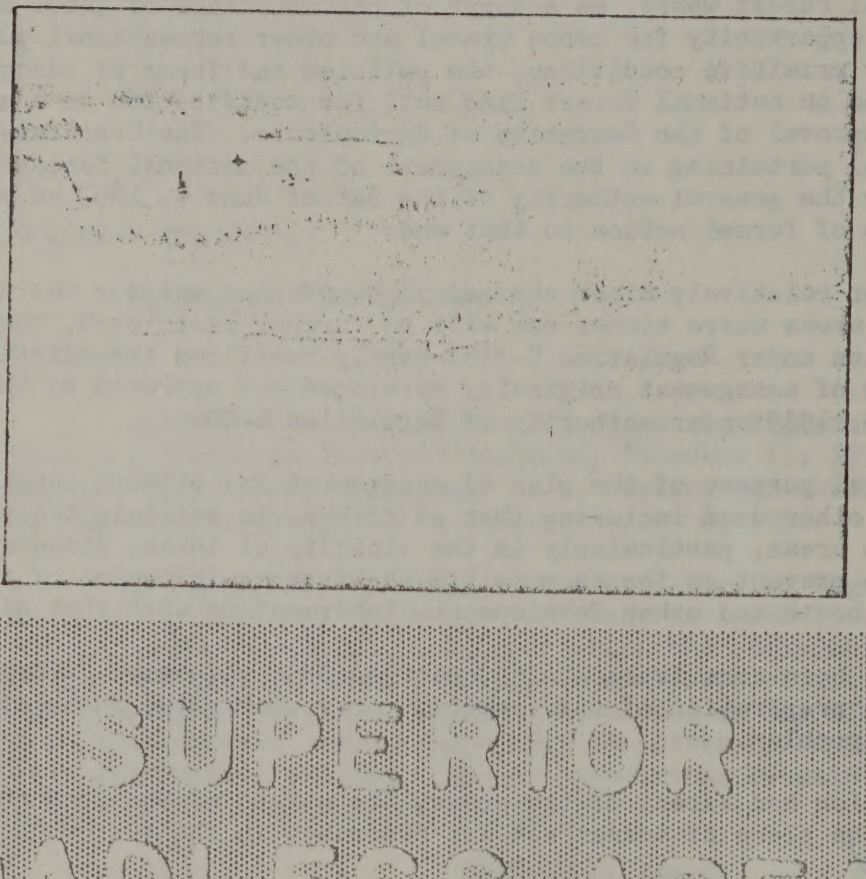
Recommended 1-7-48 (date) Jay H. Price
Regional Forester

/s/Lyle F. Watts

Recommended 2-11-48 (date) Lyle F. Watts
Chief, Forest Service

APPENDIX ITEM 5

PLAN of MANAGEMENT



SUPERIOR ROADLESS AREAS

FOREST SERVICE
U.S.
DEPARTMENT OF AGRICULTURE

SUPERIOR NATIONAL FOREST

UNITED STATES GOVERNMENT

Memorandum

2320

TO : Frank J. Welch, Assistant Secretary DATE: August 25, 1961

FROM : Richard E. McArdle, Chief - By:

SUBJECT: Near-Natural Areas - Superior - R-9 (Boundary Waters Canoe Area)

The Superior Roadless Areas, Superior National Forest, Minnesota were established by the Secretary of Agriculture on February 13, 1948, and also at the same time the Secretary approved the Plan of Management for these areas.

Attached, for your convenience, is a copy of the Order establishing the area and the Plan of Management.

On January 22, 1958 the Assistant Secretary approved a name change from the "Superior Roadless Areas" to "Boundary Waters Canoe Area," a name which is more logical and appropriate.

In connection with our acquisition of the remaining private lands, we have found that it is necessary for us to make several policy decisions. These decisions are all within the intent of the 1948 Plan of Management.

The additions recommended are as follows:

1. Addition to general purpose statement, page 1, of "Plan of Management."

   "Consistent with the above, specific purposes of management are to provide for wilderness-type recreational use of the area, to provide for timber harvesting and other commodity use in the portions zoned for such use, and to provide for use of the area for those types of research that may best, or only, be accomplished in an area managed to maintain wilderness-type environment."

2. Addition to: (Add between paragraphs 1 and 2, page 12)

   G. Policies and Plans of Management

   "Since a purpose of preserving primitive environment in this and other wilderness-type areas, is to make possible studies that utilize the environment so preserved as one of the variables in the subject covered by the study, it is necessary that the Plan of Management make provision for the use of the area for such research and for appropriate related educational activities that are likewise primarily wilderness centered. The policy will be to make appropriate provision for the area to be used for wilderness centered research and related educational activities."

3. Addition to:

II. Management Plans and Policies

B. Occupancy (Page 16)

Addition under 1:

"(e) Upon approval by the Regional Forester, structures deemed by him to be necessary for the conduct of research."

4. On page 16, change:

"C. Roads and Landing Strips"

to:

"C. Transportation"

Items 1 through 3 remain unchanged.

Add Item 4:

"4. The following vehicular portage is recognized as usage which was in place prior to the designation of the locality included in the use as a part of the Boundary Waters Canoe Area, and is consequently hereby accorded recognition as an 'accepted' use within the Boundary Waters Canoe Area, subject to redesignation as 'nonaccepted' use after the acquisition by the Government of all the private land served by the portage, and after the expiration of all reservations of use agreed to by the Government in instruments conveying the land entailed, and upon a determination that the purposes for which the Boundary Waters Canoe Area is established will be best served by designation of such area as a 'nonaccepted' use:

(a) Fourmile Portage, from Fall Lake to Basswood Lake."

It is recommended that you approve the above additions to the Plan of Management.

Attachment

A.W. Greeley

APPROVED:

Frank J. Welch

Assistant Secretary

OCT 11 1961

(Date)

To : E. L. Peterson, Assistant Secretary Date: January 27, 1958

From : Richard E. McArdle, Chief, By

Subject: U-SUPERVISION, R-9, Superior, Boundary Waters Canoe Area (Proposed)

The Superior Roadless Areas, Superior National Forest, Minnesota, were established by the Secretary of Agriculture on February 13, 1948, and the Secretary also at the same time approved the Plan of Management for these areas. Attached for your convenience is a copy of the order establishing the area and the Plan of Management.

It has been apparent for some time that the term "Roadless Areas" is inappropriate, since under the Management Plan for the areas approximately half of the land is being intensively managed for timber production. High-standard logging roads are constructed and used for the harvesting of timber crops. It is confusing to many persons visiting this area to encounter roads and trucks within a so-called "Roadless Area," even though these roads are not open for public travel and it is planned to obliterate the roads after the timber harvesting has been completed.

We have given this matter careful thought and propose that the name "Superior Roadless Areas" be changed to "Boundary Waters Canoe Area." The name Boundary Waters Canoe Area is logical and appropriate since the lakes and streams along the international boundary are considered the "heart" of the area and canoeing is the predominant mode of transportation by those who use the area for recreation. The area is famous as a wilderness canoe country. The word "wilderness" was not used in the name because it has a technical connotation in connection with Regulation U-1 and this area is not a wilderness in that sense, even though it is very primitive in places. The proposed change has been discussed within the Service and the Quetico-Superior Committee has been advised. We contemplate that the proposed name "Boundary Waters Canoe Area" would include the three separate parcels of the present area - namely, the Superior, Little Indian Sioux, and Caribou. We would not attempt to give these parcels separate names.

It is recommended that you approve this change in the name of this area. The Regional Forester at Milwaukee will then put out a news release announcing it.

/s/ Edward P. Cliff

Attachment

Approved: /s/ E. L. Peterson
Assistant Secretary

1/28/58
(Date)

PROPOSAL FOR THE ESTABLISHMENT OF
THE SUPERIOR, LITTLE INDIAN SIOUX, AND CARIBOU ROADLESS AREAS
SUPERIOR NATIONAL FOREST
UNDER REGULATION U-3.

The Superior, Little Indian Sioux, and Caribou Roadless Areas, known collectively as the Superior Roadless Areas, constitute that portion of the Superior National Forest where, on account of the abundance of lakes and streams and the opportunity for canoe travel and other recreational pursuits under relatively primitive conditions, the policies and forms of management commonly employed on national forest land call for modification on a scale requiring the approval of the Secretary of Agriculture. The Secretary's Regulation U-3(a) pertaining to the management of the national forests, and formulated under the general authority of the Act of June 4, 1897 as amended, provides a means of formal action to that end.

Except for relatively minor changes in boundaries and for the designation of certain areas where timber use will be further restricted, the recommended action under Regulation U-3(a) merely reaffirms the existing status and plans of management originally developed and approved by the Acting Chief on July 25, 1939 under authority of Regulation L-20.

The general purpose of the plan of management is, without unnecessary restrictions on other uses including that of timber, to maintain the primitive character of the areas, particularly in the vicinity of lakes, streams and portages, and to prevent as far as possible the further intrusion of roads, aircraft, motor boats and other developments inharmonious with that aim.

There has been consultation with the President's Quetico-Superior Committee in the preparation of this report, particularly the administrative features of the problem.

The location and extent of the areas, the nature of the land and its resources, and the plans of management are described in the following pages of this report.

Approval under Regulation U-3(a) of the establishment of the Superior Roadless Area is respectfully requested.

Submitted 1-6-48 (date) Galen Pike Galen W. Pike
Forest Supervisor

Recommended 1-7-48 (date) Jay H Price Jay H. Price
Regional Forester

Recommended 2-11-48 (date) Lyle F Watts Lyle F. Watts
Chief, Forest Service

Approved:

By virtue of the general authority vested in me by the Act of June 4, 1897 as amended, and in conformity with the Regulation U-3(a) pertaining to the management of the national forests, the Superior Roadless Areas, as described on the attached map are hereby established, and will be managed according to the principles set forth in the management plan attached hereto.

February 13, 1948 (date) Clinton Anderson Clinton P. Anderson
Secretary of Agriculture

MANAGEMENT PLAN - SUPERIOR ROADLESS AREAS

I. Introductory Statement

A. Location and Extent

The three roadless areas are located in Cook, Lake, and St. Louis Counties, Minnesota, and occupy slightly over one million acres of land and water in the northern portion of the Superior National Forest. They extend from east to west approximately one hundred and ten miles. Their greatest north to south extent is about thirty miles with an average of about half of that distance.

The northern boundaries of the Superior and Caribou areas coincide with the international boundary between Canada and the United States. The two areas are separated by a non-roadless zone along the highway known as the Gunflint Trail and leading to the lake of that name and to other neighboring points on the international border waters. The Little Indian Sioux area is located to the south of the western portion of the Superior area and is separated therefrom by a non-roadless zone along the highway extending northerly and westerly from Ely, and known as the Ely-Buyck road or Echo Trail.

The boundaries of the three roadless areas, their geographical relation to each other, and their contiguity with Canadian territory are shown in detail on the accompanying map.

The gross acreage of each of the three areas and of the three collectively, broken down into land and water (surface of meandered lakes), are shown in the following table. Also shown are land areas by ownership, a significant factor which is discussed elsewhere in this report.

Table 1

Land and Water Acreage

Name of Area	U. S.	State	Private	Total Land	Water	Total Gross
Superior	580,968	68,605	100,829	750,402	139,573	889,975
Little Indian Sioux	41,571	31,945	14,069	87,585	15,433	103,018
Caribou	29,098	6,244	2,595	37,937	7,813	45,750
Grand Total	651,637	106,794	117,493	875,924	162,819	1,038,743
Percent land ownership	74%	12%	14%	100%		
Percent land and water				84%	16%	100%

B. Physiography

Compared with average Lake States topography, much of the roadless areas is rough and broken. There are, however, few real extremes in surface irregularity. Elevations range from one thousand to somewhat over two thousand feet above sea level. A point near Winchell Lake in the eastern part of the main Superior Roadless Area is 2,230 feet above sea level (about 1,600 feet above the level of Lake Superior) and is reputed to be the highest point in Minnesota.

The soil is a glacial drift of sandy or gravelly loam. It is generally shallow, with some outcrops of parent rock along ridge tops and lake and stream shores. Glacial boulders are prevalent in the soils but are not commonly a conspicuous feature of the landscape except along some lake shores.

The average annual precipitation is about 27 inches, including an average snowfall of about 59 inches. Temperatures vary between occasional localized extremes of -50° F. and +106° F. The average monthly mean temperatures range from a low of +9° F. in January to a high of +62° F. in July.

The most conspicuous and significant feature of these areas is the abundance of lakes. They range in size from Lac La Croix along the Canadian border, which is over 20 miles long, to small bodies of water which are little more than wide places in slowly flowing streams. Even Lac La Croix and its sister lakes along the border are so elongated and so broken up by peninsulas and islands that in effect each is a group of smaller lakes, consequently there are few large expanses of water. Furthermore, the distribution of the lakes is such that even where they are not connected by navigable streams, which in most cases they are not, travel between lakes can be accomplished over relatively short portages. Thus the water pattern is ideal for canoe travel, with the length of trip and the number of lakes visited limited only by the wishes of the travelers. The adjacent territory north of the border, particularly Quetico Provincial Park, is of the same character, and the two areas provide opportunities unequalled elsewhere for canoe travel under primitive and near-primitive conditions.

C. Physical Resources

1. Timber

About one-third of the national forest land acreage within the roadless areas was cutover prior to acquisition by the United States. The other two-thirds include some acquired properties, but in the main consist of public domain lands which were made part of the Superior National Forest at the time of the original proclamation in 1909. These lands had not passed to private ownership prior to that date mainly because large and severe fires had destroyed or badly depleted whatever high value timber that had once existed. Timber came back on most of the old burns, but except in the spruce swamps, the dominant types became jack pine and aspen. Thus, while most of the non-cutover area now support what are considered commercial stands, they consist mainly of short-lived species having major value for pulpwood rather than for lumber.

The general nature of the timber stands for all federal ownership within the areas may be summed up by saying:

> (a) that 58 percent supports timber in commercial volume, an additional 27 percent supports satisfactory stands of young growth, and the remaining 15 percent consists of inadequately stocked cut-overs, brush, naturally barren, and otherwise unproductive areas; and (b) that jack pine is the dominant cover on 27 percent of the area, aspen on 23 percent, spruce on 19 percent, and white birch on 14 percent, with the remaining 17 percent either given over to a variety of types of lesser prevalence, such as white and red pine (accounting for 3 percent), balsam, and cedar, or devoid of appreciable tree growth.

Based upon the best available information, the volume of merchantable size material on federally-owned lands is as shown in the following table:

Table 2

Timber Volumes On Federal Lands

Species	Sawlog material (millions of board feet)	Additional pulpwood material (thousands of cords)
Jack pine	435.1	542.5
White pine	80.9	8.6
Red pine	32.5	6.4
Black spruce	100.3	670.5
White spruce	1.3	9.0
Balsam	10.9	111.2
Tamarack	0.5	1.5
Aspen	194.0	560.8
Birch	41.4	459.0
Totals	896.9	2,369.5

In addition there is estimated to be enough cedar to produce about 335,000 poles and 742,000 posts.

Converted to a common unit of measurement, all of the foregoing quantities add up to 2,101 million board feet.

Less is known about the quantities of timber on state and privately-owned land. Probably the present stand of merchantable material, including both sawlogs and pulpwood, is the equivalent of about 500 million board feet. If so, the total volume for all ownerships is in the neighborhood of 2,600 million board feet.

A statement of merely the conversion possibilities of the timber stands does not adequately express all the values. The timber cover is an integral part of the primitive, inspirational and recreational values of the lake country, and those considerations call for its preservation without disturbance over substantial portions of the roadless areas. Even where timber harvests are appropriate, due consideration in management must be given to such matters as watershed protection and wildlife habitat.

2. Water

Water constitutes the key resource of the roadless areas. Without the many lakes these areas would lose entirely their distinctive and unique character. Maintenance of natural lake levels and protection of lakes and streams against pollution and other abuses are essential requirements in the management of the areas.

There exist within the roadless areas, particularly within the main Superior area, substantial physical potentialities for commercial water power development. At one time rather extensive developments were proposed, and much study and debate followed. Out of the controversies there emerged both federal and state legislation directing the maintenance of existing water levels and thus effectively barring large scale water storage developments for power and other purposes. The only waters within the roadless areas subject to regulation are parts of the chain of lakes above the Fall Lake power house near Winton, where minor controls may be exercised under authorities granted prior to the enactment of the aforementioned laws.

3. Wildlife

Wildlife, particularly fur-bearing animals, has always been an important resource. The first explorations and uses of the areas, dating back to colonial days, were in connection with the fur trade. Beaver, otter, fisher and marten were particularly important species and beaver is still reasonably abundant. The habitat is good for deer, moose and bear, all of which are reasonably plentiful. The areas are practically the only places in the United States where the great gray or timber wolf can be maintained in fair numbers without damage to livestock and other interests. A substantial portion of the areas is in state game refuges, and the regulation of seasons of take and bag limits for all game and furbearers are responsibilities of the State.

The following non-migratory species are found in the areas in varying degrees of abundance:

Big game - moose, whitetail deer, bear.
Upland game - snowshoe hare, ruffed grouse, spruce grouse.
Furbearers and predators - timber wolf, brush wolf or coyote, red fox, bobcat, lynx, beaver, mink, otter, fisher, muskrat, weasel.

Mallard, teal and black duck nest in the areas. These and other ducks, as well as various species of geese, are visitors during their seasonal migrations.

Sport fishing constitutes an important element of the recreational allure of the areas. While in comparison with waters of similar size located in warmer and more fertile areas, the lakes do not support abundant fish populations, such species as lake trout, wall-eyed pike, great northern pike, black bass, and sand pike are reasonably plentiful. Rainbow, brook and brown trout have been introduced in a few lakes where the habitat is favorable for their development.

The lands passed to the State through federal land grants in support of educational activities and are held and managed for that purpose. Disposal is limited to exchanges for properties of at least equal value. The nature of the grants, namely sections 16 and 36 of each surveyed township, swamp and overflow lands, and possibly some lieu selections, has resulted in a wide dispersal of state ownership.

Despite a reasonably sustained program of federal acquisition during the last fifteen years, fourteen percent of the land area (approximately 117,000 acres) remains in private ownership. Most of this land was originally appropriated for timber values and logging purposes, and much of it has been logged once for sawtimber and some of it a second time for pulpwood. However, substantial timber values still remain unharvested, particularly on a few relatively large holdings in the western portion of the main Superior area and to a lesser extent in the extreme eastern part of that area. Of lesser acreage but of greater significance than the primarily timber holdings are the many smaller tracts of lakeside property held for present or future recreational uses.

As in the case of state-owned lands, the private holdings are widely dispersed. Of the three roadless areas, Little Indian Sioux has the highest percentage of private ownership, about 16 percent. Caribou has the lowest percentage, about 7 percent. The main Superior is average, with about 13 percent. However, there are two large portions of the Superior area where private ownership and use is relatively light. One is the territory closely bordering Crooked Lake and the eastern portions of Lac La Croix. The other is east and southeast of Basswood and Snowbank Lakes and extends to but does not include Saganaga, Sea Gull, and Brule Lakes.

The increasing use of the fishing resources and the maintenance of desirable numbers of wolves, fisher, and other rare animals present specia problems of wildlife management. As a future program, it may prove desirable to give the roadless area special wildlife management status, wherein the State and the Forest Service would cooperate in fact finding, planning, and development and application of fish and game measures specifically suited to the roadless area.

4. Mineral

There are broad mineral belts within and adjacent to the roadless areas. Iron ore of relatively low grade is the chief known resource. Most of the acquired federal lands were accepted with mineral rights outstanding or with long-term reservations by the vendors. Consequently, about one-third of the federal ownership in the three areas is subject to mineral reservations or exceptions. It is expected, however, that but few serious conflicts with recreational and other uses will arise, and that when they do they can be confined to relatively small areas. At the present time there are no mineral developments in the roadless areas.

5. Agriculture and Grazing

Due to the climatic drawbacks, the nature of the soil, and the abundance of tree cover, there is no grazing of domestic livestock or farming.

D. Ownership and Occupancy

As indicated in Table 1, twelve percent of the land ownership, (approximately 106,000 acres) is vested in the State of Minnesota.

Except for the cabins, boathouses, and lookout towers required for public land protection and administration, all of the existing developments of a permanent nature designed for human occupancy are on privately-owned land. There are at present 65 such developments. Forty-one are resorts of various sizes and types, and there are twenty-two summer homes. The remaining two are homes occupied year-long. The resorts are operated only during the summer season and occupancy of the summer homes is confined to the same period. Caretakers are usually required at the resorts during the non-operating season.

Thirty-one of the 41 resorts and all except one of the summer homes are located on West Lac La Croix, Basswood, Saganaga and Sea Gull Lakes. The remaining eleven developments are widely scattered on other lakes, mainly on those along the Canadian border.

This development has taken place over a considerable period of time, beginning with the wane of lumbering along the border waters. Recently, however, there has been an accelerated rate of development, due mainly to the increased availability and use of aircraft for ingress and egress. The result has been the invasion of several lakes with high wilderness value which were previously free of development, thus seriously reducing the truly remote and primitive portions of that roadless area.

E. Public Interest in the Roadless Areas

Widespread public interest in the border lake country is of long standing. Primarily it is due to the physical characteristics that have been described briefly in this report, particularly the variety and charm of the waterways and their suitability for canoe travel. Not all boat transportation is by canoe - larger motor driven craft abound on Basswood Lake and are used on many of the others. Nevertheless, canoes represent the traditional and most typical means of transportation on all but the larger and most developed lakes and even there they are by no means absent. In short, the area represents the largest canoe country in the United States and offers a variety in the extent and type of trips that is not equalled elsewhere.

The land area is by no means an unspoiled wilderness, since fires and logging have taken their toll. Nevertheless, nature has done much to heal the scars until now the forests provide a satisfying environment for the lakes and portages. That they harbor animal life of variety adds charm and interest for most travelers.

The presence of game fish rounds out the gifts that nature offers, and angling gives direction and purpose to many expeditions.

Public interest in the areas is intensified by the inherent advantages of central location on the North American Continent. They are near the large centers of population of the Middle West and are by no means remote from the Atlantic seaboard. More than 5,000,000 people live within 300 miles of these areas. Nevertheless, they do not constitute merely an isolated island in the midst of developed country. Rather, they are a part of a much larger territory of similar character extending north of the border. The Superior Areas are alluring in themselves but they are even more so on account of their contiguity with Quetico-Provincial Park and other Canadian wilds.

Last, but perhaps not least, as a matter of general public interest is the early history of the border lake country. There the atmosphere of voyageurs, Indian legends, and early fur trade still prevails and it is not forgotten that through the area passed many early expeditions to the vast inland territories. The old canoe routes not only fashioned the mode of travel - they had much to do with the economic, religious, and political development of substantial portions of two nations.

In addition to the foregoing values, there are elements of public interest of an economic character. While local people no doubt enjoy the primitive aspects of the roadless areas as much or more than many others, they also have a very live interest in the economic aspects of recreational travel. It means much to the business and general well-being of their communities. While opinions naturally differ and some no doubt would prefer unrestricted development of resorts in the roadless areas, others, and it is thought the majority, realize that such development would seriously impair the very qualities that bring people to the region and in the long run would adversely affect local business and payrolls and the local tax base.

These areas are in part responsible for drawing more than 200,000 recreationists to this general forest country annually in addition to more than 300,000 persons who only use the highways. The recreationists come for relaxation and health purposes, for sight seeing, or for one or more of the other many types of recreation which the areas provide, such as boating, camping, fishing, hiking, hunting, nature studies, pack trips, picnicking, riding, swimming and winter sports. As an indication of the substantial character of the economic return, it is estimated that the expenditures by recreationists on the Superior National Forest average more than $2,000,000 annually.

For the State as a whole the recreational business ranks third in importance and is only exceeded by agriculture and mining as the leading industries.

Various surveys taken of visitors to these forest areas indicate that they come from practically all the States as well as from foreign countries. One season's survey showed representation from 39 different States and several foreign countries. Approximately 40% of the users are from Minnesota.

Another economic element of the situation is that of the timber resource. Many visitors no doubt would like to see all timber on the roadless areas preserved from cutting. It is a natural feeling, especially if their observations happen to include logging, which at best leaves temporary scars on the landscape. On the other hand, the timber stands of merchantable size in the roadless areas represent nearly a third of the present stand on the Superior National Forest and five percent or more of the total stand in the State of Minnesota. Only a portion of this needs to be withdrawn from the channels of manufacture and trade to protect effectively the recreational values.

F. Development of the Superior Roadless Area Program

Almost from the beginning of the Superior National Forest in 1909 there was evidence of general interest in the wilderness aspects of its northern lake country. However, it was not until about fifteen years later that the interest expanded and became vocal in opposition to developments and trends thought inimical to wilderness preservation. In 1925 the situation was brought to a head by a proposal to develop water storage for power purposes on many of the lakes of the Rainy River Watershed including those in the Superior National Forest. The Quetico-Superior Council was formed to fight that proposal, and around it rallied such organizations as the Izaak Walton League, the Minnesota Department of the American Legion, and the Arrowhead Association. Many other local and national organizations and many influential citizens gave their support.

Out of the foregoing there emerged a concrete program for the preservation of wilderness values, the main points of which were opposition to further commercial developments in the unsettled portions of the Rainy River and Pigeon River watersheds, exclusion of additional dam or other structures that would disturb natural water levels, and reservation from cutting of all timber immediately bordering lake and stream shores. The program achieved such importance that in 1930 Congress enacted the Shipstead Newton-Nolan Law. It provides for reservation of timber along the shores of streams and lakes suitable for boat travel where the land is in federal ownership, and prohibits federal agencies from granting permits or licenses that convey authority to change natural water levels except in minor respects when required for logging. The area affected by the law covers much of the Superior National Forest and all of the roadless areas described in this report except the southern half of the Little Indian Sioux.

In 1933 the State of Minnesota enacted a similar law applicable to state-owned lands.

In further recognition of the importance of this and related programs, the Quetico-Superior Committee was created by executive order in 1934 "to consult and advise with the various Federal departments and agencies concerned and with the State of Minnesota, and to make such recommendations from time to time as it deems proper." The Committee consists of five members, three appointed by the President, one representing the Department of Agriculture, and one representing the Department of the Interior. While the membership has changed to some degree, the Committee is still active. It has taken a particularly active interest in affairs pertaining to the Superior Roadless Areas. The Committee's authority was renewed and broadened by executive order in 1947.

Concurrently with the foregoing developments the Forest Service was evolving wilderness plans and policies for application on a service-wide basis. Among the early dedications was the establishment in 1926 of the Superior Primitive Area, embracing approximately those portions of the present roadless areas that were at that time within the National Forest boundaries.

In 1936 the Superior National Forest was greatly enlarged. The expansion included much border lake territory and considerable area elsewhere of a generally primitive nature. During the ensuing two years the feasibility of enlarging the Superior Primitive Area was carefully studied. The result was that in 1939 three separate primitive roadless areas were established, the Superior, the Little Indian Sioux, and the Caribou. These three new areas included all or substantially all of the old Superior Primitive Area plus suitable lands in the 1936 forest extensions.

In 1940 and 1941, the Forest Service made a study of the adequacy of the statutory requirements for timber reservations as applicable to the lakes along and near the Canadian border, the thought being that something more than statutory protection would be justified for those waters. The conclusions and findings were that wholesale resumption of rafting of forest products on the border and adjacent lakes would not be compatible with the uses that have developed since the old logging days, that the only federally-owned specimens of old growth red and white pine stands of any great consequence are near the border lakes, and that the application of the bare requirements of the Shipstead-Newton-Nolan Act in areas presenting extensive and intricate patterns of water would, in itself, prevent cutting on much of the land area and badly complicate logging on the remainder. Other considerations were the relative inaccessibility for logging purposes of the border country and the less than average productive capacity of much of the land in that locality.

The consequence of the study was the designation for administrative guidance of the so-called "no-cutting" area, the approximate boundaries of which are shown on the map accompanying this report. The current administrative policy for this no-cutting area, and the one which will be formalized by inclusion within the policy recommendations of this report, is to refrain from making commercial sales of timber except to take care of the occasional and small local requirements or to salvage stands of timber killed by fire, insects, or other causes.

The gross (land and water) area of the no-cutting reservation is about 362,000 acres. The land area alone is about 255,000 acres, or 29 percent of the land area in the three roadless areas.

Approximately one-fifth of the government timber volume of all of the roadless areas (see Table 2) is within the no-cutting area. It is estimated that in any event about 30 percent of this one-fifth is reserved by the provisions of the Shipstead-Newton-Nolan Act and a substantial but undetermined portion of the remainder is thereby rendered inoperable.

In 1946 the roadless area boundaries designated in 1939 were given critical review. This study was stimulated by and gave consideration to the many opinions and recommendations expressed by various interested groups and individuals. As a result of the review the boundaries recorded on the map accompanying this report represent several modifications of former roadless area boundaries. With the exception of an elimination in the general vicinity of Silver Island Lake northeast of Isabella, these changes are minor. However, even with that area considered, the net acreage eliminated represents but a small fraction of the roadless area total and involves no modification of roadless area objectives or sacrifice in their attainment.

G. Policies and Plans of Management

The general purpose of giving the areas special status is given briefly on page 1 and is further defined by implication elsewhere in this report. It is in conformity with the principles of multiple use for the areas as a whole, but takes cognizance of the special values of the resources in relation to recreation, and within that field, to the relatively primitive character of the country and to the methods of transportation that give it particular distinction.

In considering the applicability and probable effectiveness of federal land management policies, the several limitations and complications that exist must be recognized. While the policies employed on federal land are highly important they are not in themselves the complete solutions to all the problems that exist. Supplemental programs, as will be discussed later, are necessary to insure against partial negation of roadless area objectives.

Many of the complicating factors result from the mixed ownership, especially the presence of considerable areas of privately-owned land. These holdings represent appropriations of long standing, and in connection with many of them, particularly lake shore properties, certain types of improvements, use and transportation have developed through the years in a perfectly lawful manner and from quite legitimate motives. Recent expansions of development, particularly to lakes heretofore undisturbed, force attention to the significance of the private land situation. Incomplete public ownership cannot effectively curb additional development regardless of how desirable that objective is.

Another complicating factor is the growing use of hydroplanes. It is a critical threat to the remaining wilderness qualities of the area and to such native resources as fish and game. It is a stimulant to the development of heretofore undisturbed areas. Control of the use of navigable waters is not vested in abutting ownerships, hence federal land controls can have but a very indirect and generally ineffective influence on the situation.

Before listing the specific policies and controls for national forest land, it may be well to mention another situation. It relates to the type and condition of certain of the resources, of which timber is of most concern. Much of the forest within the roadless areas now consists of even-aged stands. Many of such stands are approaching or have reached maturity - some are overmature and decadent. While the policy will be to employ on cutting areas only the best known silvicultural methods, in some instances they will necessarily embody clear cutting. Until restocked those areas will not be satisfying to the eye of the occasional visitor that wanders back from the recreational zones where the timber is left intact.

Another problem is how to interpret the requirements of the Shipstead-Newton-Nolan Act in reference to the maintenance of water levels. Many lakes and stream levels are dependent upon the existence of old dams constructed during the early logging days. In many instances the existing levels are in effect the "natural" ones. The old dams have a limited remaining life, and eventually must be replaced by modern structures or the waters allowed to go back to original levels. Presumably the requirements of the law could be interpreted to permit either practice. Practically there will be, no doubt, considerable variation in practice, depending upon the value at stake and the availability of funds. Any statement of policy must necessarily be general rather than specific.

II. Management Plans and Policies

The following policies will govern the use and management of federal land within the Superior roadless areas. They constitute in large part a repetition of policies already in effect, and thus have the advantage of having been tested over a considerable period of years. They necessarily apply only to land now owned or hereinafter acquired by the United States for national forest purposes. They are not intended to impose any regulations or procedures that are not within the authority of the Secretary of Agriculture.

A. Timber Cutting

1. The Shipstead-Newton-Nolan Act is effective on all the roadless areas except the southern portion of the Little Indiana Sioux. Its provisions shall be administratively applied even on that legally omitted area. The Act prohibits logging on federal land within 400 feet of the natural shore lines of border lakes and streams and of other lakes and streams now or eventually to be in general use for canoe or boat travel, except as the Forest Service in particular instances may vary the distance for practical reasons, but in no case shall logging of any timber other than diseased, insect infected, dying or dead be permitted closer to the natural shore lines than 200 feet except where necessary to open areas for uses in connection with logging operations.

The general purpose of the Act is to preserve for recreational reasons the natural beauty of the shore lines. The spirit and purpose as well as the letter of the law shall govern cutting operations.

(a) Within the two-hundred foot strip no cultural work of any description shall be permitted except upon a positive determination of an unusual hazard which may result in widespread devastation of the strip itself or of adjacent forest land.

(b) In the interest of better shore line protection, the width of the outer strip may be varied to conform more closely with the practical requirements of the topography, but a minimum average width of 400 feet from shore lines shall be the rule. In addition to cultural work permitted in the case of unusual hazards, limited cultural work for salvage or contributing to the maintenance of the vigor of the stand may be permitted along the outer edges where not conspicuously visible from the shore line. Additional timber outside the 400-foot limits shall be left where necessary in the interest of adequate protection of the wilderness setting and values of frequently used water routes.

(c) Clearing within the reserved strips for temporary roads or other facilities required by logging shall be kept to a minimum and shall be as inconspicuous as possible. Except where clearly impracticable, work camps, equipment dumps, and similar facilities shall be located at least 200 feet back from shore lines of lakes or streams used for canoe or boat travel, and preference in selection of sites shall be given to those where complete screening is possible.

(d) The application of the foregoing requirements shall be determined by the Forest Service in advance of operations, and except under unusual circumstances, such as the removal of a few scattered trees, the cutting limits shall be suitably marked on the ground before cutting begins. The location, extent and type of clearings for temporary roads, camps, and other facilities shall be in accordance with plans approved in advance by the Forest Service.

(e) To the degree required for reasonable screening from cutting operations, the type of protective measures employed along shore lines shall be extended to portages and to other foot trails adjacent to water areas and commonly used for recreational travel.

2. In addition to the restrictions imposed by the Shipstead-Newton-Nolan Act, no cutting of timber shall be permitted in the reserved or no-cutting area along and adjacent to the Canadian border, the approximate boundaries of which are shown on the map accompanying this report, except for the purpose of supplying minor amounts of timber to legitimate activities located within or adjacent to the area, of salvaging timber stands killed or badly damaged by fire, insects, or other causes, of controlling serious insect and disease epidemics, and of abating critical fire hazards.

3. The cutting of timber on unrestricted areas shall be in accordance with the best silvicultural practices applicable to the type, vigor and operating feasibility of the various stands encountered. Where clear cutting is necessary, effective steps shall be taken within existing financial limitations to insure restocking.

4. The location and design of all improvements necessary for the harvesting and removal of timber and other resources shall be approved in advance by responsible forest officers. Such approval shall include provision for a restoration of the area through the removal or dismantlement of all structures upon completion of the logging job.

B. Occupancy

1. No permits shall be granted for structures for human occupancy and attendant uses except:

(a) As required for the harvesting and removal of forest, mineral and other products.

(b) As required for the conduct of essential public business.

(c) In rare instances to adjust innocent trespass on government-owned land.

(d) Infrequently, and only after advance approval by the Regional Forester, to make possible in the interest of the area as a whole the shifting of recreational enterprises from relatively undeveloped zones to those already and presumably permanently characterized by recreational developments.

2. Except for such facilities as lookout towers, all permanent structures, whether erected under permit or by the Forest Service itself, shall in so far as practicable be of native material and shall be located and designed to harmonize with the forest environment.

C. Roads and Landing Strips

1. Except as it may be held essential in exercising the lawful rights of ingress and egress, no roads other than those required for the removal of timber, mineral and other resources shall be permitted. The construction and use of timber and other resource roads shall be only that required by, and incidental to, the removal of the products, and upon completion of the above operations and forest rehabilitation, all use shall terminate, maintenance shall cease, and frequent effective road blocks shall be provided in key locations through such means as the removal of drainage structures, back filling of deep cuts and plowing of the road bed. Tree growth on abandoned roadbeds will be encouraged by all practicable means.

2. The location and construction of all roads permitted under the previous section shall be in accordance with plans approved in advance by the Forest Supervisor.

3. No aircraft landing strips shall be permitted.

D. Use of Area by Aircraft and Motorboats

The landing of airplanes on national forest land or water and the use of motor boats on national forest waters will be closely restricted. Both will be prohibited except in the areas where the employment of such facilities by the public has already become well established. Both airplanes and motorboats will continue to be used by the Forest Service to the degree necessary to provide efficient administration of the area and adequate protection of its resources.

E. Public Service Improvements

1. No docks for canoe travel will be constructed except at marshy or extremely rocky landings or in rare instances elsewhere to meet the requirements for public safety. Practical docks will be permitted on the larger lakes to accommodate motor boats. All docks shall be of native material and shall be kept as inconspicuous as practicable.

2. Portages and trails shall be constructed to the minimum standard required for the type and intensity of use. The primitive character of the trails should be preserved to the utmost extent practicable.

3. Campgrounds shall be improved only where use creates sanitation and fire protection hazards. Only native material and primitive methods of construction shall be employed.

4. Directional and other signs shall be permitted where necessary for public safety and convenience. All signs shall be of rustic character except those marking portage termini, which should be of such color as to be readily visible for a reasonable distance from shore.

F. Dams

The Shipstead-Newton-Nolan Act provides that unless specific authorization is granted by subsequent Congressional action, no permit or license shall be issued by any federal agency which will result in flooding lands of the United States through further alteration of natural water levels of lakes and streams, provided that nothing in the Act shall be construed as interfering with (a) the duties of the International Joint Commission and (b) action taken in accordance with the agreement between the United States and Canada for the purpose of regulating the levels of the Lake of the Woods, and provided further that at the discretion of the Forest Service, reservoirs not exceeding one hundred acres in size may be constructed for logging or recreational purposes and that small, temporary dams may be placed in streams to temporarily maintain water levels, not higher than the normal high water marks, required for essential logging purposes.

1. It is contemplated that there will be little future need for small reservoirs and for temporary dams in the streams. Should the need arise, location and construction shall be in accordance with plans approved in advance by the Forest Service, and permits shall include whatever restrictions are judged necessary to prevent unnecessary modification of natural conditions.

2. As mentioned before the legality and propriety of maintenance and replacement of old dams can be variously interpreted. The general objective, as expressed in the law, is "to preserve the shore lines, rapids, waterfalls, beaches, and other natural features of the region in an unmodified state of nature."

The general policy shall be not to interfere with the disintegration through natural processes of old dams nor to provide for their replacement, thus allowing water levels to gradually resume their original state. Exceptions shall be made only where public benefits, as measured in terms of preservation of existing shore line values and of navigation use, clearly justify such action. In such cases the work of maintenance and replacement shall be conducted as harmoniously as practicable with surrounding natural conditions.

III. Supplemental Program

Elsewhere has been mentioned the problems arising from mixed land ownership and from the growing use of aircraft. It seems desirable to describe more fully the types of corrective action that would be helpful and that seem reasonably attainable.

A. Ownership

1. State

State ownership has presented no problems of consequence, since state management policies are substantially in harmony with those followed on federal land. However, administration would be simplified by federal acquisition of state areas through granting in exchange federal lands of equal value now owned or to be acquired elsewhere. Federal and state administrative agencies are in agreement as to the desirability of such a program and it will be pursued as diligently as practicable, subject to the prior requirements for the acquisition of private land and the limitations imposed by state and federal regulations and policies.

2. Private

The chief threat to roadless area objectives evolving from the land ownership situation is centered in the private holdings in those portions of the areas still relatively undeveloped. It is there that primitive conditions most abundantly prevail and where preservation can be insured with least expenditure of public funds and with least disturbance of existing occupancy. Fortunately, many of the most highly regarded canoe routes are in those localities, since private development has in the main centered elsewhere around a few of the larger bodies of water.

There is needed a vigorous, realistic, and adequately financed program of federal acquisition. Through such means additional developments for the areas as a whole can be kept within bounds and there can be eliminated or shifted in an equitable manner those relatively few establishments whose continued existence in place is incompatible with the character of the zones in which they are located. Some transactions can no doubt be handled under authority of the federal land exchange acts. Appropriations for some of the remainder can be made under authority of the Weeks Law. However, federal purchase of certain types of tracts, such as where improvements account for the major portion of the value, is not clearly authorized by any existing law. Such legislation is needed.

B. Use of Aircraft

It is generally recognized that the increase in the use of hydroplanes constitutes a critical threat to the qualities that make the areas outstanding. Were such use confined to travel to resorts and summer homes, it would not necessarily be too serious. However, there is a constantly growing plane traffic to and from all portions of the area that afford water surfaces adequate for landing and taking off. Thus, there is an increasing, and potentially unlimited, disturbance of the qualities of remoteness, quietness, and solitude that furnish much of the charm of the areas. The resulting pressures on fish population have already been mentioned. Much of the business involves but short visits to the areas, often but a day or less, and thus by-passes the resorts in the areas. It can be expected eventually to by-pass in large measure even the communities in adjacent areas. Although already given some study, authority for control over navigable waters not under the jurisdiction of the Forest Service is not yet clear, and as yet no concrete plan has been evolved. There is definite need for further and specific attention to this problem.

Name Change to Boundary Waters Canoe Area - 1958

To : E. L. Peterson, Assistant Secretary Date: January 27, 1958

From : Richard E. McArdle, Chief, By

Subject: U-SUPERVISION, R-9, Superior, Boundary Waters Canoe Area (Proposed)

The Superior Roadless Areas, Superior National Forest, Minnesota, were established by the Secretary of Agriculture on February 13, 1948, and the Secretary also at the same time approved the Plan of Management for these areas. Attached for your convenience is a copy of the order establishing the area and the Plan of Management.

It has been apparent for some time that the term "Roadless Areas" is inappropriate, since under the Management Plan for the areas approximately half of the land is being intensively managed for timber production. High-standard logging roads are constructed and used for the harvesting of timber crops. It is confusing to many persons visiting this area to encounter roads and trucks within a so-called "Roadless Area," even though these roads are not open for public travel and it is planned to obliterate the roads after the timber harvesting has been completed.

We have given this matter careful thought and propose that the name "Superior Roadless Areas" be changed to "Boundary Waters Canoe Area." The name Boundary Waters Canoe Area is logical and appropriate since the lakes and streams along the international boundary are considered the "heart" of the area and canoeing is the predominant mode of transportation by those who use the area for recreation. The area is famous as a wilderness canoe country. The word "wilderness" was not used in the name because it has a technical connotation in connection with Regulation U-1 and this area is not a wilderness in that sense, even though it is very primitive in places. The proposed charge has been discussed within the Service and the Quetico-Superior Committee has been advised. We contemplate that the proposed name "Boundary Waters Canoe Area" would include the three separate parcels of the present area - namely, the Superior, Little Indian Sioux, and Caribou. We would not attempt to give these parcels separate names.

It is recommended that you approve this change in the name of this area. The Regional Forester at Milwaukee will then put out a news release announcing it.

/s/ Edward P. Cliff

Attachment

Approved: /s/ E. L. Peterson
Assistant Secretary

1/28/58
(Date)

CASE STUDY NO. XV

YOSEMITE VALLEY,
YOSEMITE NATIONAL PARK, CALIFORNIA

by

GEORGE TREICHEL

Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

INTRODUCTION

Yosemite National Park, located in the center of the Sierra Nevada range in California, is one of the superlative specimens of wild America. The Park's spectacular core feature, the Yosemite Valley, is an ice-carved valley of heroic proportions. Its sheer granite cliffs and domes, incomparable waterfalls, and mosaic of vegetation combine to create one of the most remarkably scenic locations on our planet, a cultural and scientific asset of national and international significance.

The establishment of the "Park" in 1864 set a precedent of real importance for it was one of the first steps of any consequence taken to protect our natural scenic resources, and from it and several related events, our national conservation movement has emerged. Yosemite, as Hans Huth has pointed out, was "the point of departure from which a new idea began to gain momentum."

Today, the Yosemite Valley probably has more kinds of recreational user impact than any other national park in our system. As a consequence the ecological health of the area and the quality of the visitor "experience" is threatened. The Valley represents in essence the basic conflicts which exist in the National Park Service. Traditional National Park Service philosophy has stressed that the parks are "for the benefit and enjoyment of the people" while at the same time maintaining that the areas are to be retained "in their natural condition" with emphasis on leaving them "unimpaired" for future generations.

The Yosemite Valley problem can best be summarized by examining visitation figures for the entire Park, noting that over 90% of all Park visitors enter the Valley proper which comprises less than 1% of the total park area. In 1946 there were approximately 640,000 annual visitors; in 1965, 1.6 million; in 1969, 2.3 million. Based on present trends, the three million figure will be reached in the mid to late 1970's. On Memorial Day weekend, 1969, over 70,000 visitors and their vehicles entered the Valley, an area of only seven square miles, and virtually transformed it into an urban park.

Increasing numbers and densities of people and their internal combustion vehicles are no longer conducive to an enjoyable park experience during peak periods (usually the summer period) and are contributing to resource damage. One National Park Service study estimates that "if present trends in visitation pattern continue, the intolerable crowding which exists on peak weekends will be an every day occurrance during the summer season by 1977." Unless significant changes are made in the operation of the park, an increasing population with increasing affluence, interests, leisure and mobility, will destroy the very values that the Park was set up to preserve for future generations. (Fig. 1 - 12)

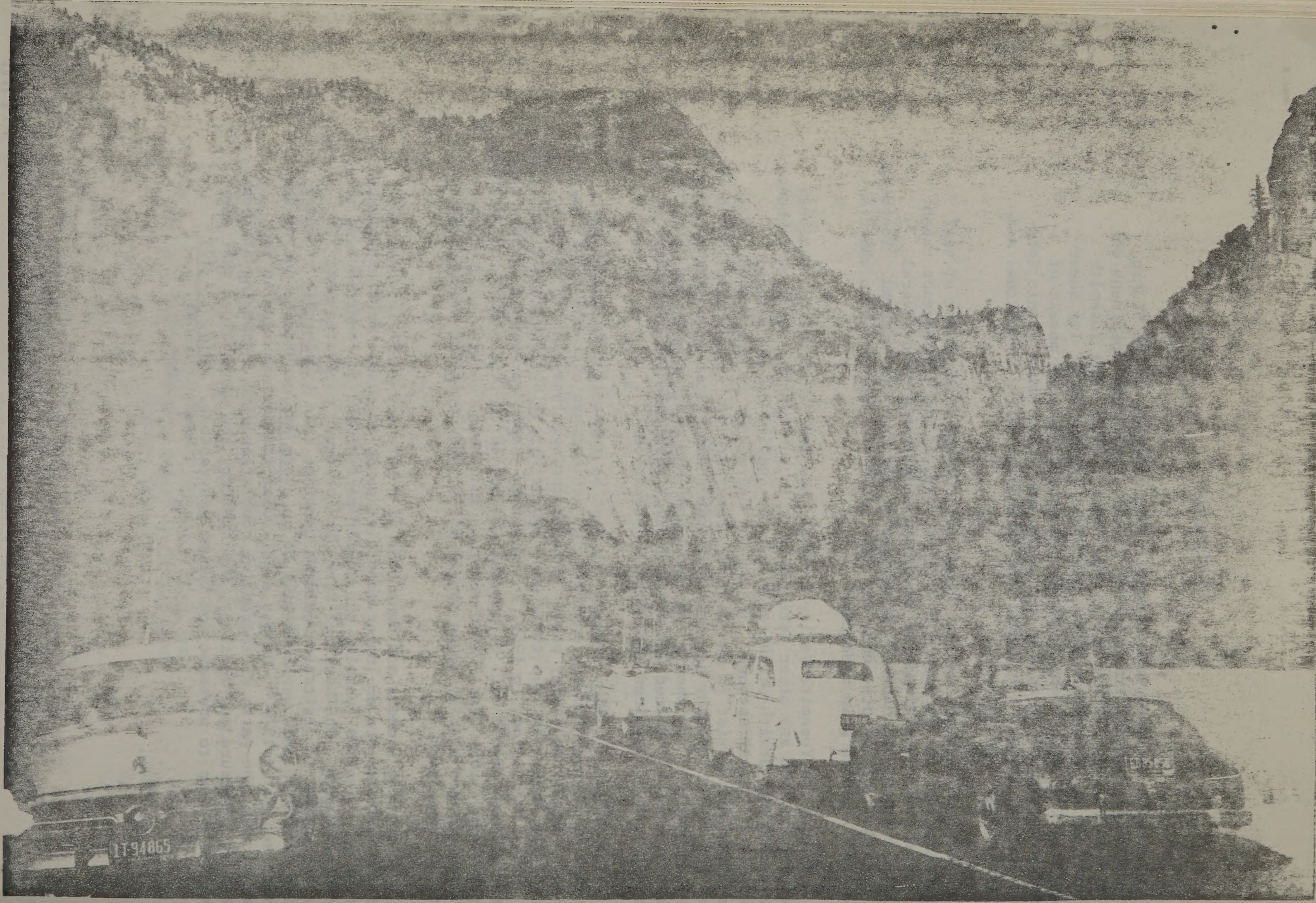


Fig. 1. Traffic in July 1952; Meadow west of Chapel, looking northeast toward North Dome.

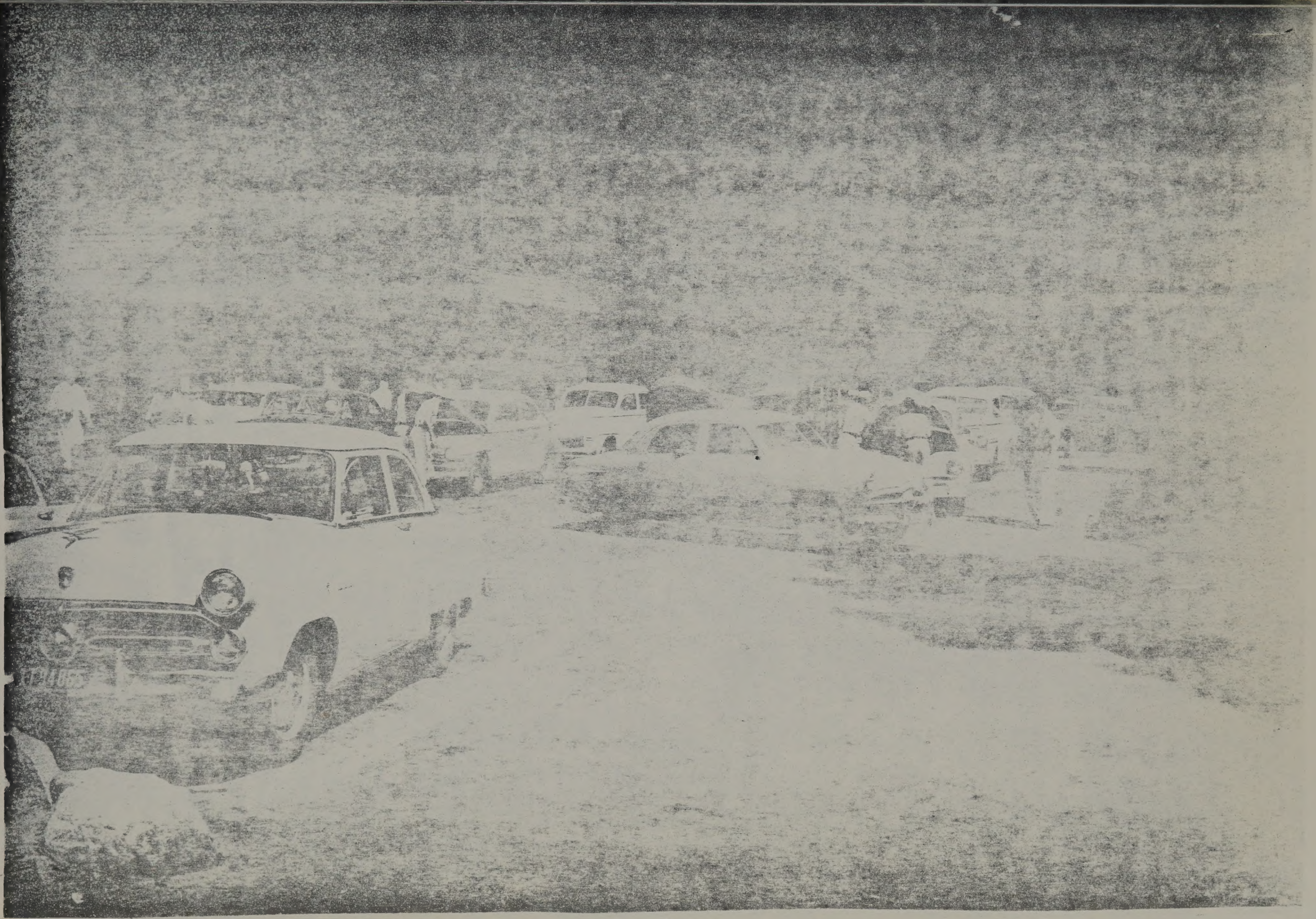


Fig. 2. The old gasoline station in the Village, July 1952.

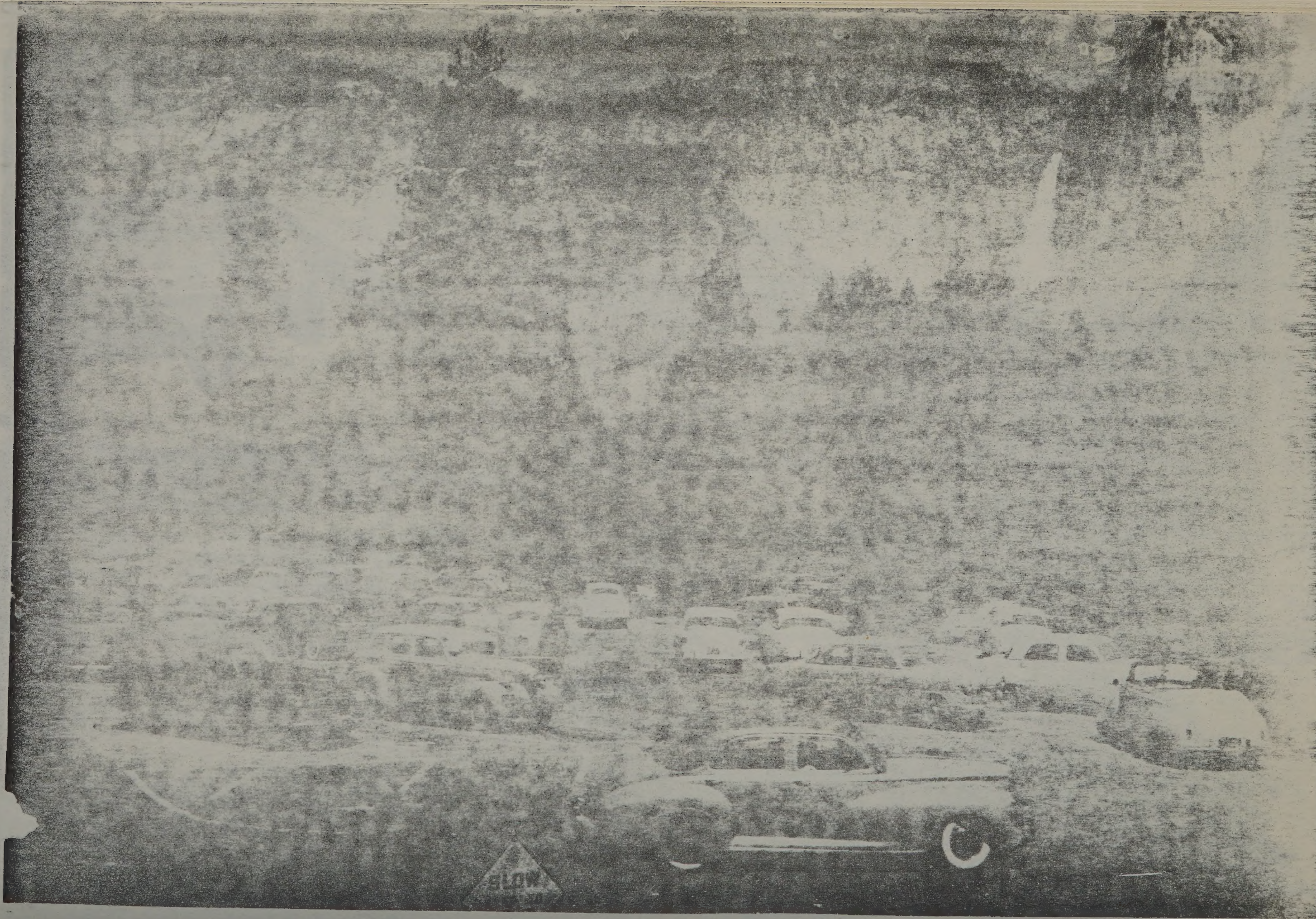


Fig. 3. Camp Curry parking lot, July 1952; looking northwest toward Yosemite Falls, July 1952.

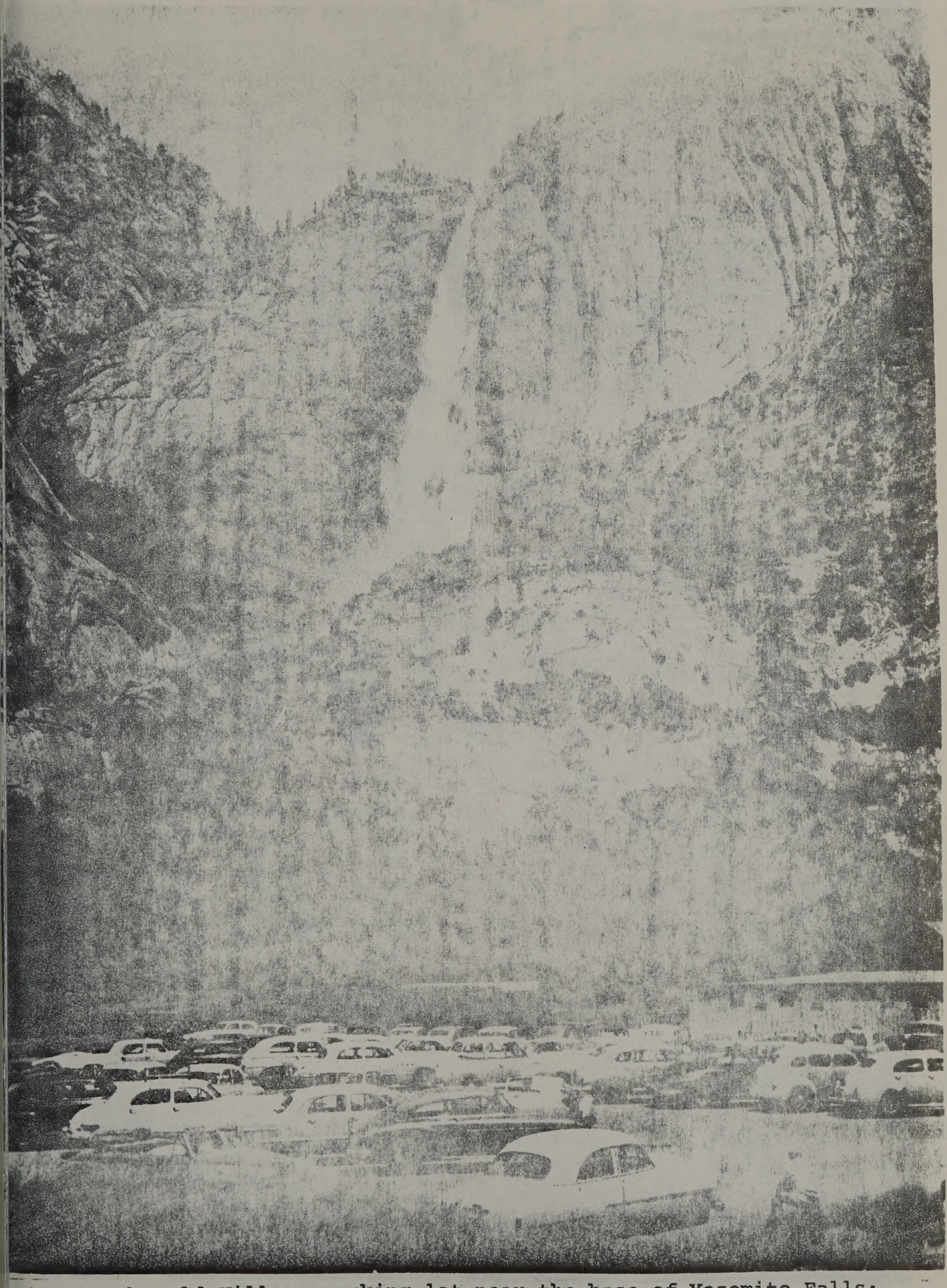
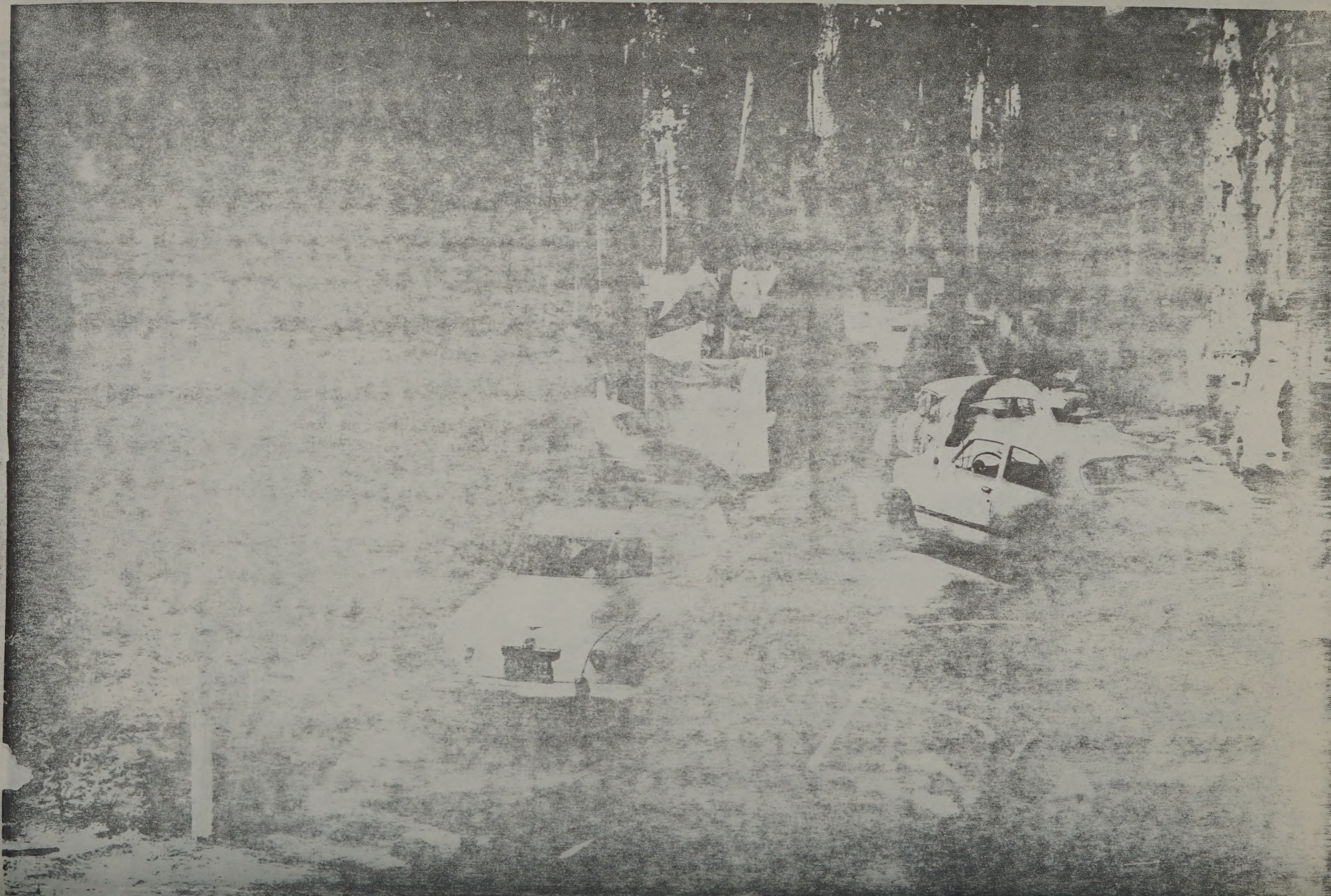


Fig. 4. The old Village parking lot near the base of Yosemite Falls; July 1952.



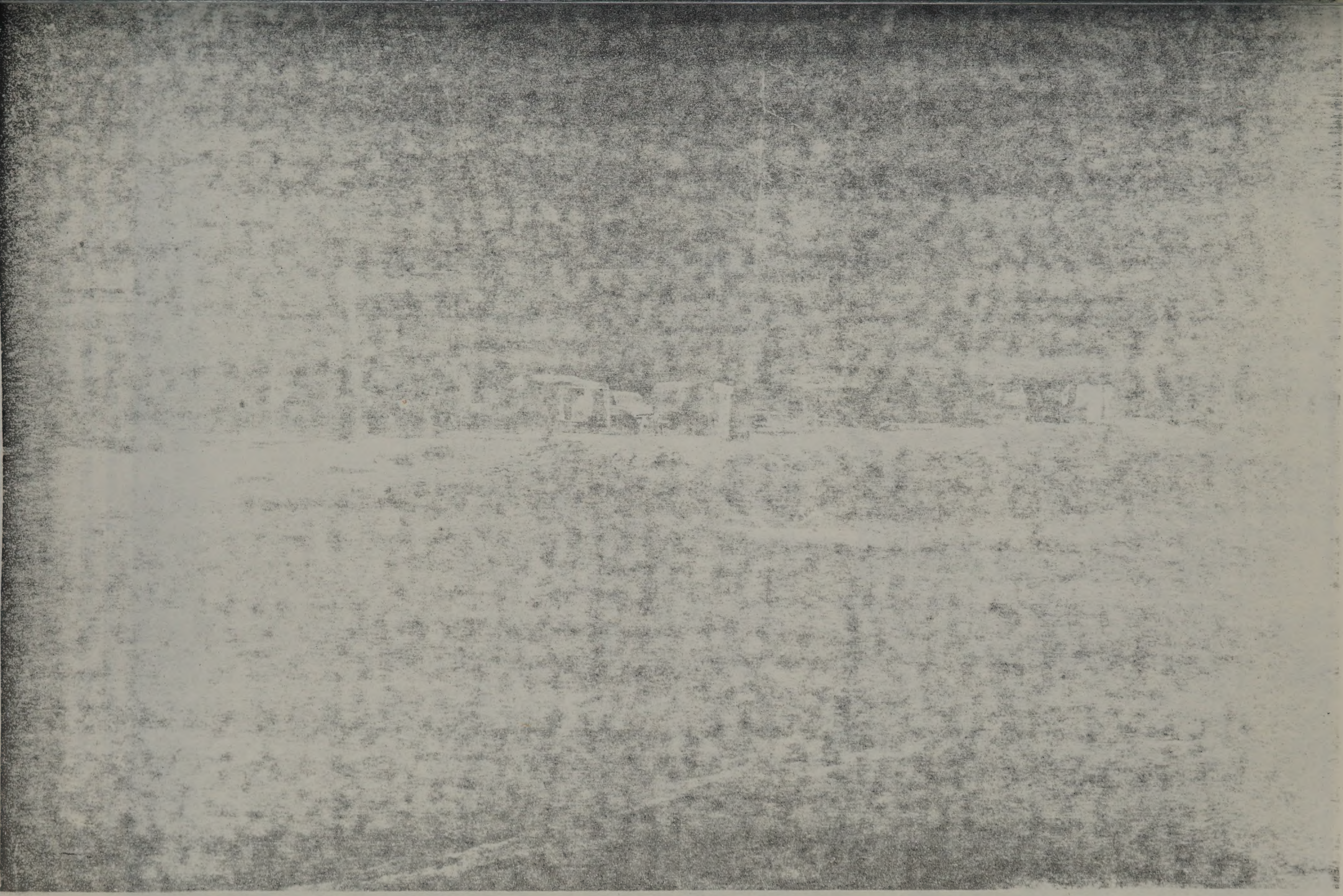


Fig. 6. Campgrounds and denuded, trampled banks along the Merced River, July, 1952.

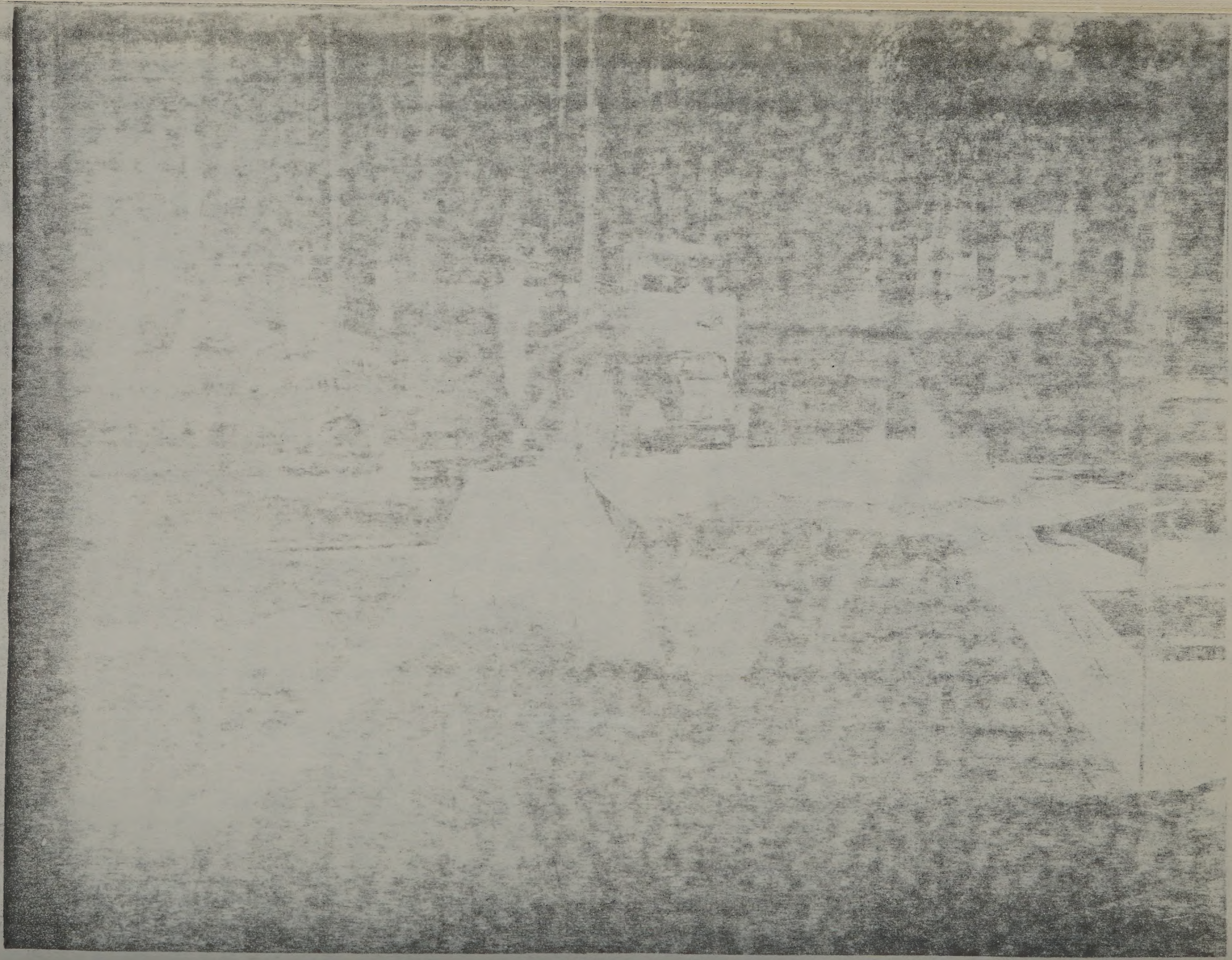
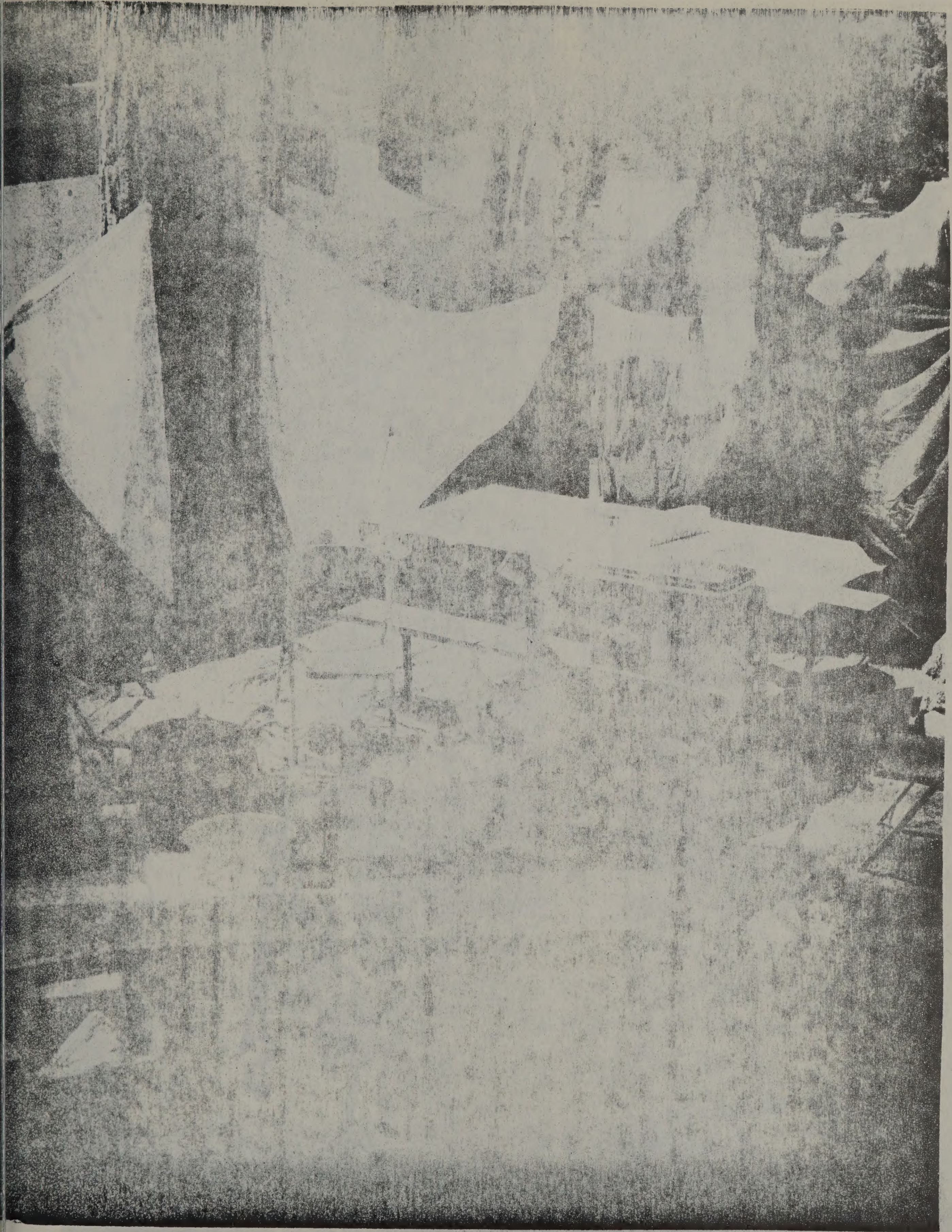


Fig. 7. Automobile Campground crowding, mid-1960's.



8. American automobile camping; Yosemite National Park, mid-1960's. Swimming in/along the Merced River, mid-1960's. The natural vegetation has been destroyed.

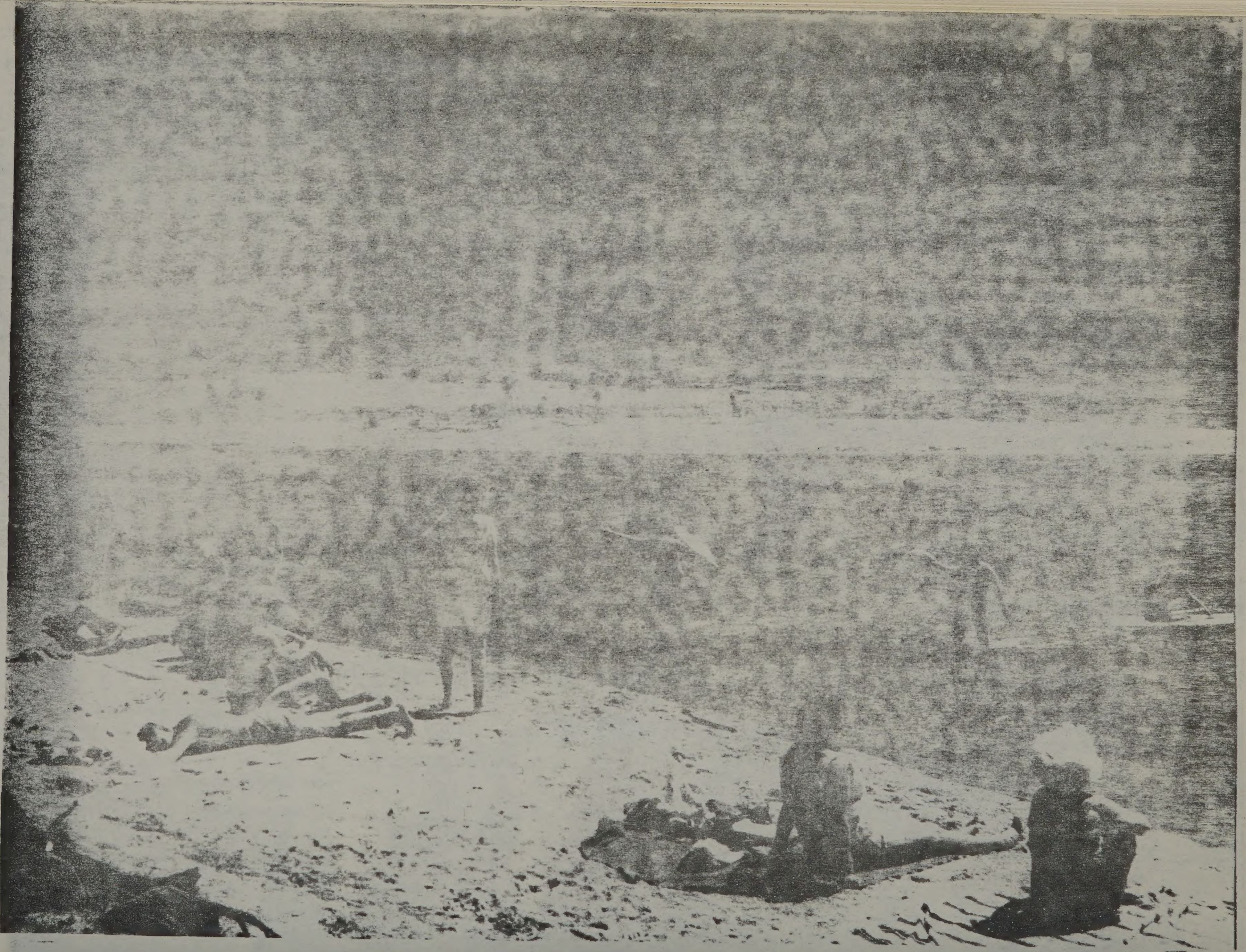


Fig. 9. Swimming, Merced River, mid-1960's.

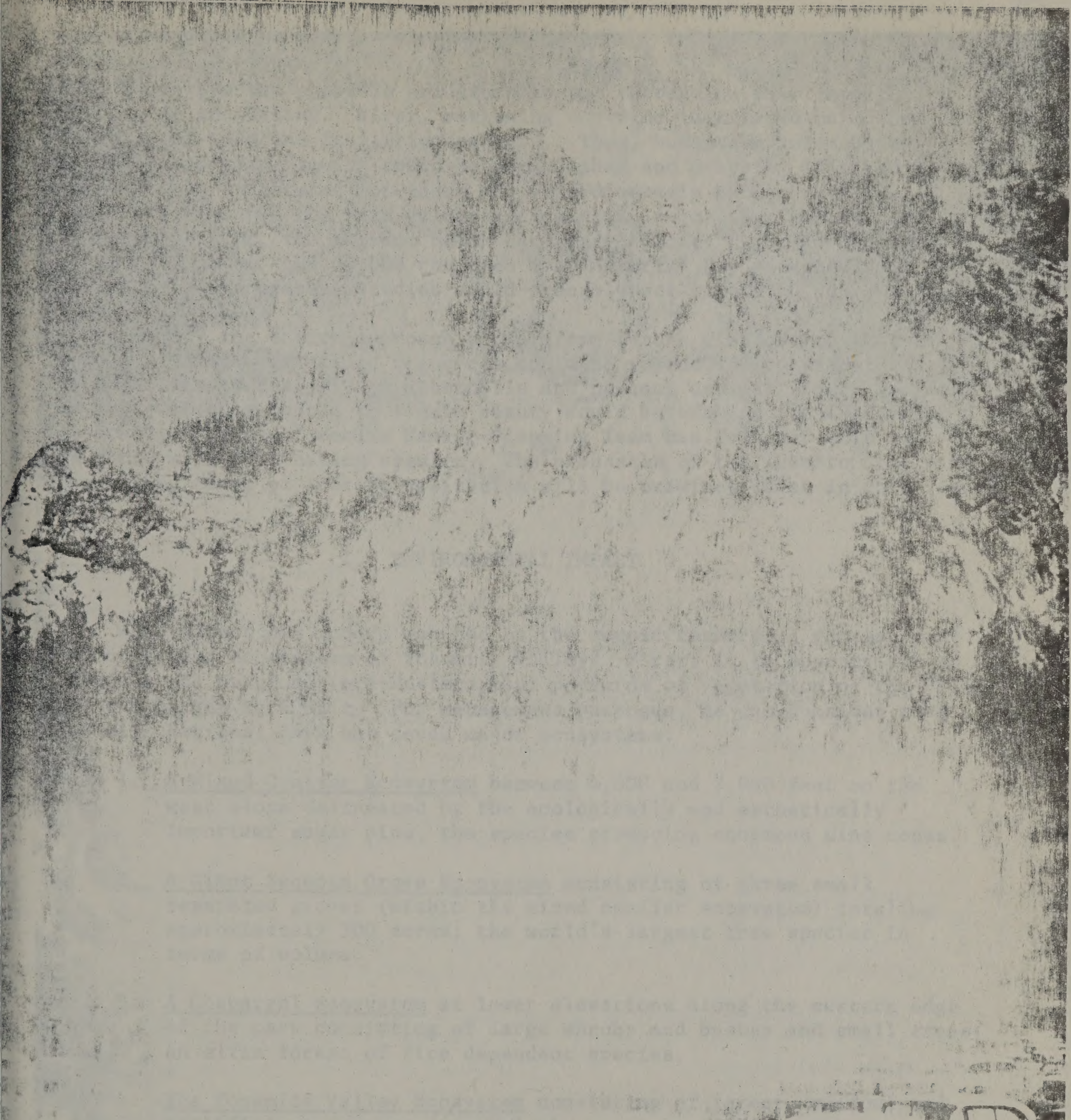


Fig. 10. The Yosemite automobile problem.

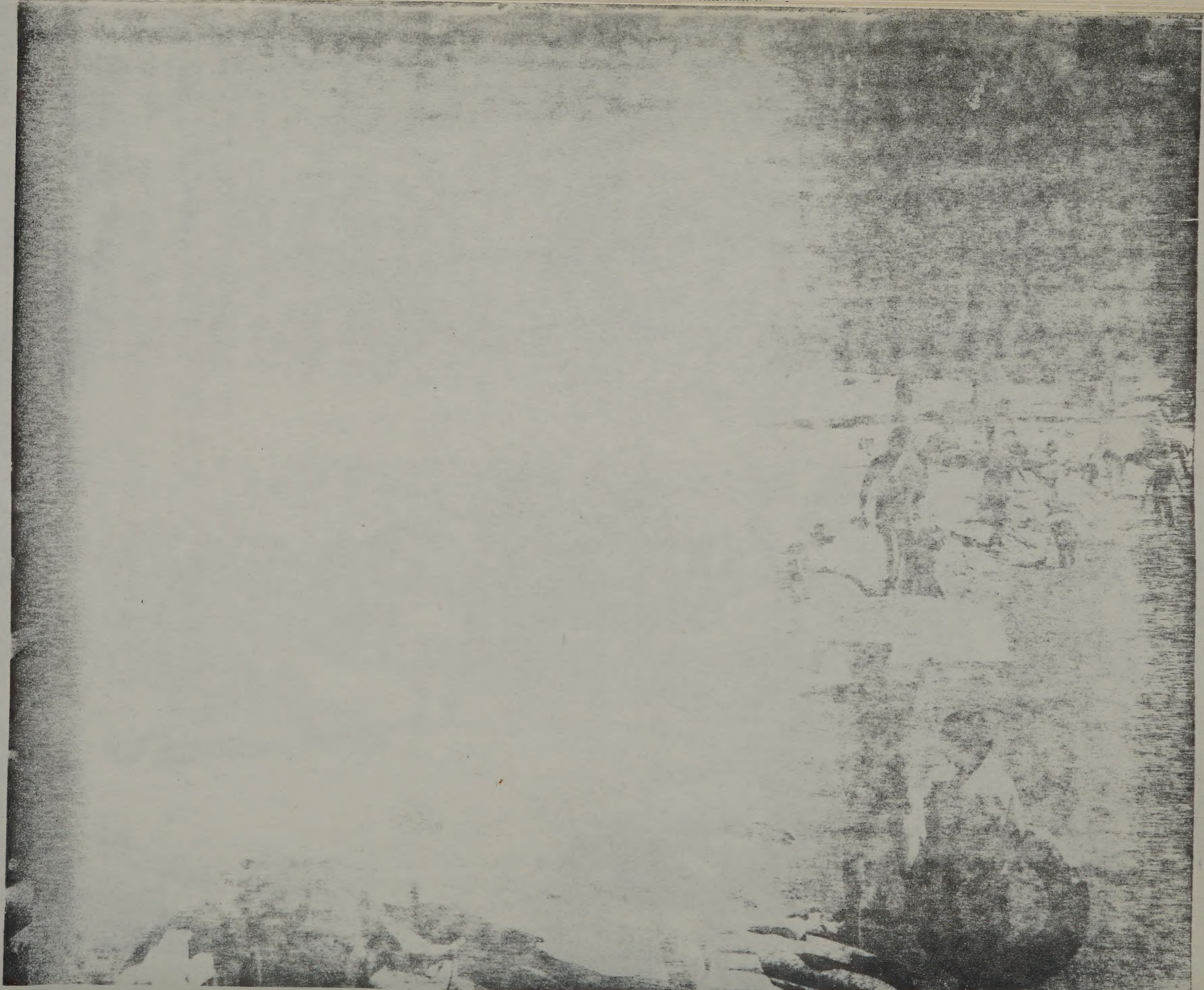


Fig. 11. Weekend traffic, mid-1960's.

There are two possible solutions to the recreation user impact problem in the Valley. First, rationing could be instituted based on the present road and facilities pattern. Thus, human and automobile carrying capacity figures could be established and a system of advance reservations instituted for those who wished certain entrance to the Park. To preserve the Park values and maintain a quality "experience" for each visitor, the maximum human carrying capacity figure would have to be well below the 70,000 recorded over Memorial Day weekend 1969; the figure based on present studies would probably not exceed 40,000 per day.

Second, the entire approach to relating future visitors to the Valley's remarkable scenic resources could be restudied, considering alternatives to the private automobile and present use patterns. Optimum ways of relating people to scenic beauty could be examined with a fresh approach. The new Yosemite Master Planning Team has followed this sort of route with fascinating results. The proposals of the Team to cope with the rising curve of tourist visitation will be examined later in this report.

I. ENVIRONMENTAL IMPACT

What effect has modern man had on the scenic resources, recreational resources and ecosystems of Yosemite Valley? First, it is appropriate to consider the original (pre-Western man) patterns of vegetation of the Valley and the larger Park unit. For management purposes, he can consider that Yosemite National Park has seven major ecosystems:

1. A Mixed Conifer Ecosystem between 4,000 and 7,000 feet on the west slope delineated by the ecologically and esthetically important sugar pine, the species producing enormous pine cones.

2. A Giant Sequoia Grove Ecosystem consisting of three small separated groves (within the mixed conifer ecosystem) totaling approximately 300 acres; the world's largest tree species in terms of volume.

3. A Chaparral Ecosystem at lower elevations along the western edge of the park consisting of large shrubs and bushes and small trees; an elfin forest of fire dependent species.

4. The Yosemite Valley Ecosystem consisting of forest, meadows and magnificient scenery (see below).

5. A Red Fir Ecosystem dominated by one species of tree occupying the mid-elevations of the Park from approximately 6,000 to 9,000 feet.

6. A Lodgepole-Subalpine Ecosystem between the red fir ecosystem and the alpine regions of the Park, including most of the "high country" and Tuolumne Meadows; many pure stands of Lodgepole Pine.

7. An Alpine Ecosystem generally above 10,000 feet consisting largely of perennial herbs; a contrast to what is essentially a forested national park.

II. THE YOSEMITE VALLEY ECOSYSTEM

The Valley is approximately seven miles long, averages about one mile in width and includes a short section of the Merced River Canyon. It lies at approximately 4,000 feet elevation and has a spectacular rim and promontories rising another 3,000 feet. Natural features like Half Dome, El Capitan, many waterfalls, Mirror Lake and the clear Merced River give the area a unique identity and make it "one of the most beautiful landscapes on the face of the earth." Scenery is the primary natural resource of the Yosemite Valley Ecosystem.

The vegetation on the floor of the Valley is the result of natural forces as well as more recent historical events including fire, flooding, clearing, cultivation and intensive recreational use. Widespread vegetational change has occurred since the area was first opened to post-aboriginal man in 1851. Over 470 species of plants have been recorded, including 85 species exotic to the region. Ponderosa pine (Pinus ponderosa) and Incense Cedar (Libocedrus decurrens) dominate the Valley floor, while White Fir (Abies concolor) Douglas Fir (Pseudotsuga menziesii), and a few Sugar Pine (Pinus lambertiana) also occur. The attractive Black Oak (Ouercus kelloggii)is not uncommon, and many other tree species occur in riparian situations and on the steeper talus slopes on both sides of the Valley. Apple orchards remain from an earlier period, and other exotic trees can be found in numerous locations.

Beautiful meadows occur along the flood plain of the Merced River. These are carpeted with perennial grasses and sedges, exotic Kentucky Bluegress (Poa pretensis)is one of the most abundant species.

Two mammal species once present in the Valley are now extinct: the Grizzly Bear and the Wolf. Five species of fish no longer exist in the Merced River. Six indigenous and two introduced species of fish occur at the present time.

Precipitation averages 37 inches on the Valley floor and about 40 to 50 inches on the rim; approximately two-thirds falls from December through March, much of it as snow.

III. IMPACT OF ABORIGINAL MAN

In 1851, approximately 200- 300 Indians lived in the Valley and about 22 permanent villages were located there. The villages were largely abandoned in Winter as the foothill country to the West offered more temperate living conditions. The Valley villages were composed of conical huts of poles covered with long slabs of bark from the Incense Cedar. Acorns from the Valley's then more numerous Black Oaks formed over three-fourths of the Indians' food supply. Their authentic names included YO-SEM-I-TE for "Full grown grizzly bear"; AH-WAH-NEE for the "deep, grassy valley" itself; and TEN-AY-A for a "creek or canyon" and also the chief's name.

Through the use of fire, the Indians arrested plant succession; ("succession" is the ecological term for change in vegetation patterns at a given location over a period of time), at the stage best suited to their needs. (Figs. 12-16) The result of their burning was general openness on the Valley floor, considerably fewer tracts of forest than exist today, much larger meadows, and most important, more Black Oaks, prime source of sustenance. For thousands of years the Indians "managed" their Valley with fire, "controlled" the pines and cedars, encouraged the acorn-producing oaks and created broad open vistas. They were, therefore, not passive inhabitants. When the Mariposa Battalion first entered the Valley in 1851, they found that the floor of Yosemite Valley was actively managed by aboriginal man (primarily through the use of fire) to create an attractive, culturally-induced environment.

IV. POST-ABORIGINAL MAN

To appreciate what has happened on the floor of the Valley since then, some significant dates and events should be considered:

1851 - Mariposa Battalion first to enter the Valley.

1855 - First tourist party journeying from San Francisco entered with Indian Guides.

1864 - Valley and Mariposa Grove of Big Trees granted to State of California "to be held for public use" by the U. S. Congress; Bill signed by President Lincoln.

1868 - John Muir first visited Yosemite.

1890 - An enlarged Yosemite National Park created by Congress.

1891 - Administered by the U. S. Army.

1913 - First automobiles enter Valley; Hetch-Hetchy Bill signed by President Wilson.

1914 - Civilian administration replaces Army; John Muir dies.

1917 - National Park Service organized as a Bureau of the Department of the Interior with Stephen Mather as Director.

1922 - Total number of visitors exceeds 100,000 for first time.

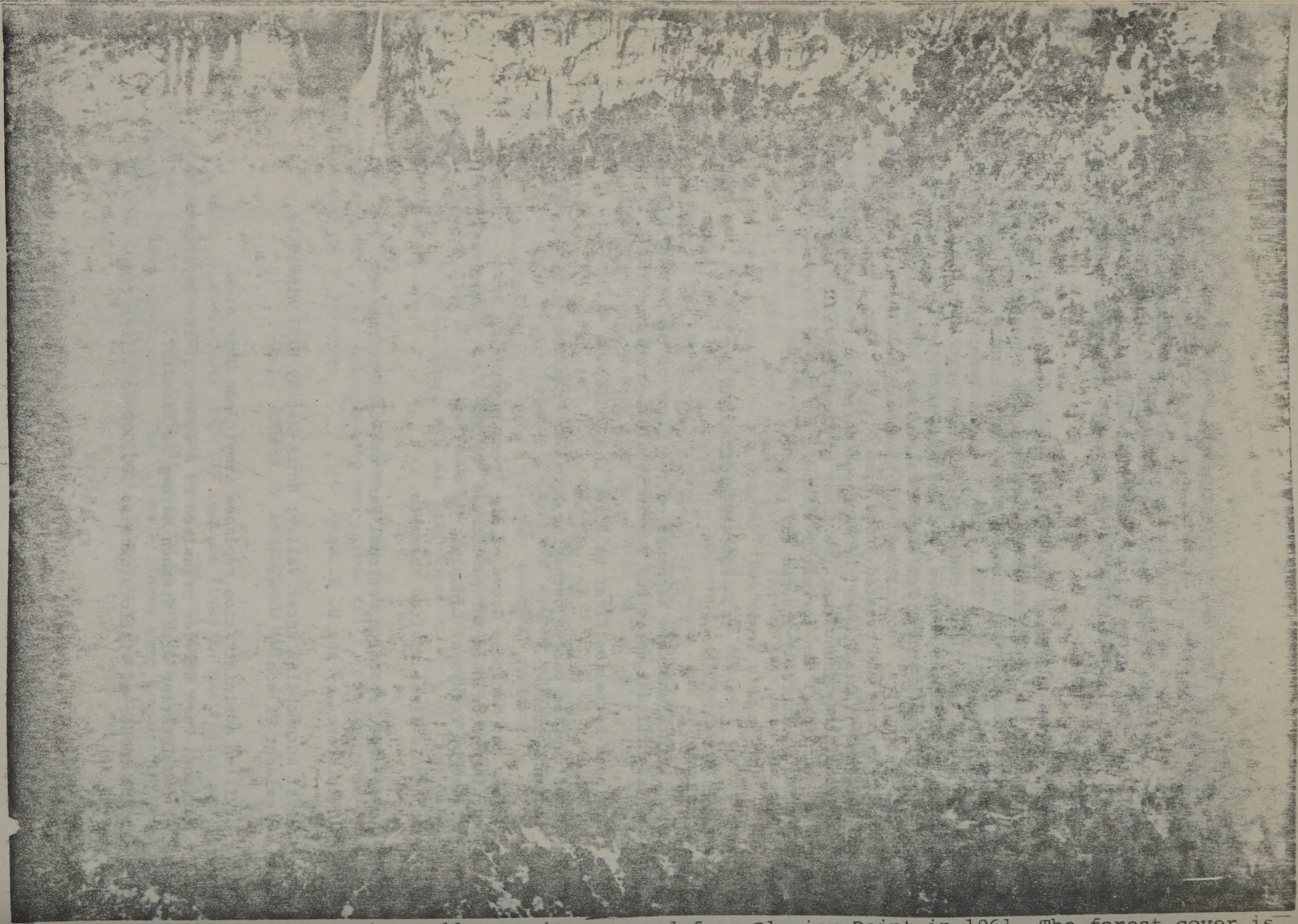


Fig. 12. The floor of Yosemite Valley as it appeared from Glacier Point in 1961. The forest cover is essentially the same as in 1943 although alteration of roadways and other construction has caused minor changes. A portion of a photograph

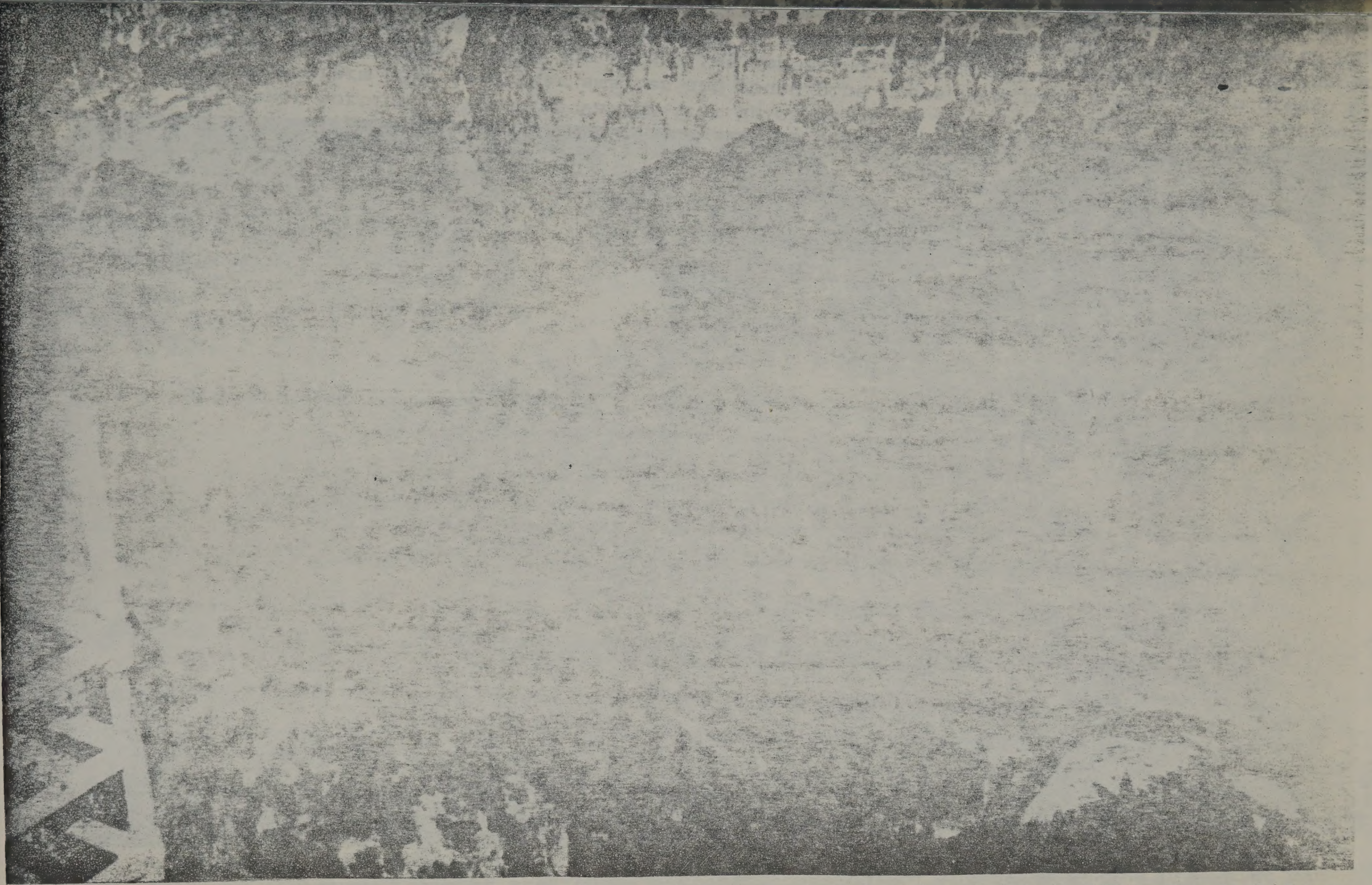


Fig. 13. The lower portion of Yosemite Valley as it appeared from Union Point in 1886. The "arbiferous belt" described by Whitney (1868) is clearly evident at the base of the talus slopes. Photograph taken by C. E. Watkins in 1866. Print from N.P.S. copy negative made by R. H. Anderson.

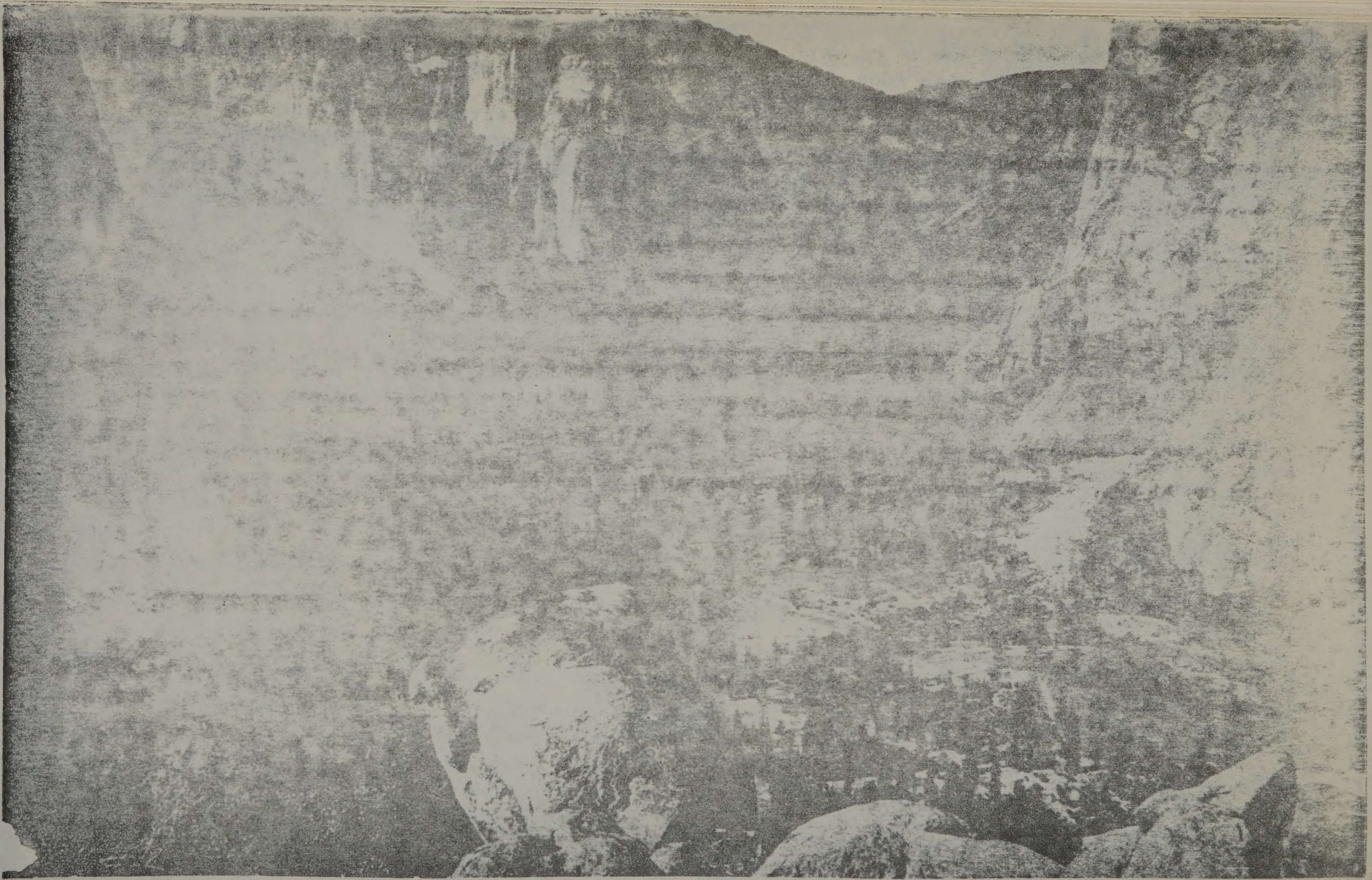


Fig. 14. The lower portion of Yosemite Valley from Union Point in 1961. The growth of trees surrounding old Sewer Farm make it appear smaller and young pine trees have made a remarkable growth within the clearing since 1943. The rock slide appearing at the base of Cathedral Spires (upper left) in 1866 has been nearly obliterated by vegetation. Photograph by R. P. Gibbens in August, 1961.

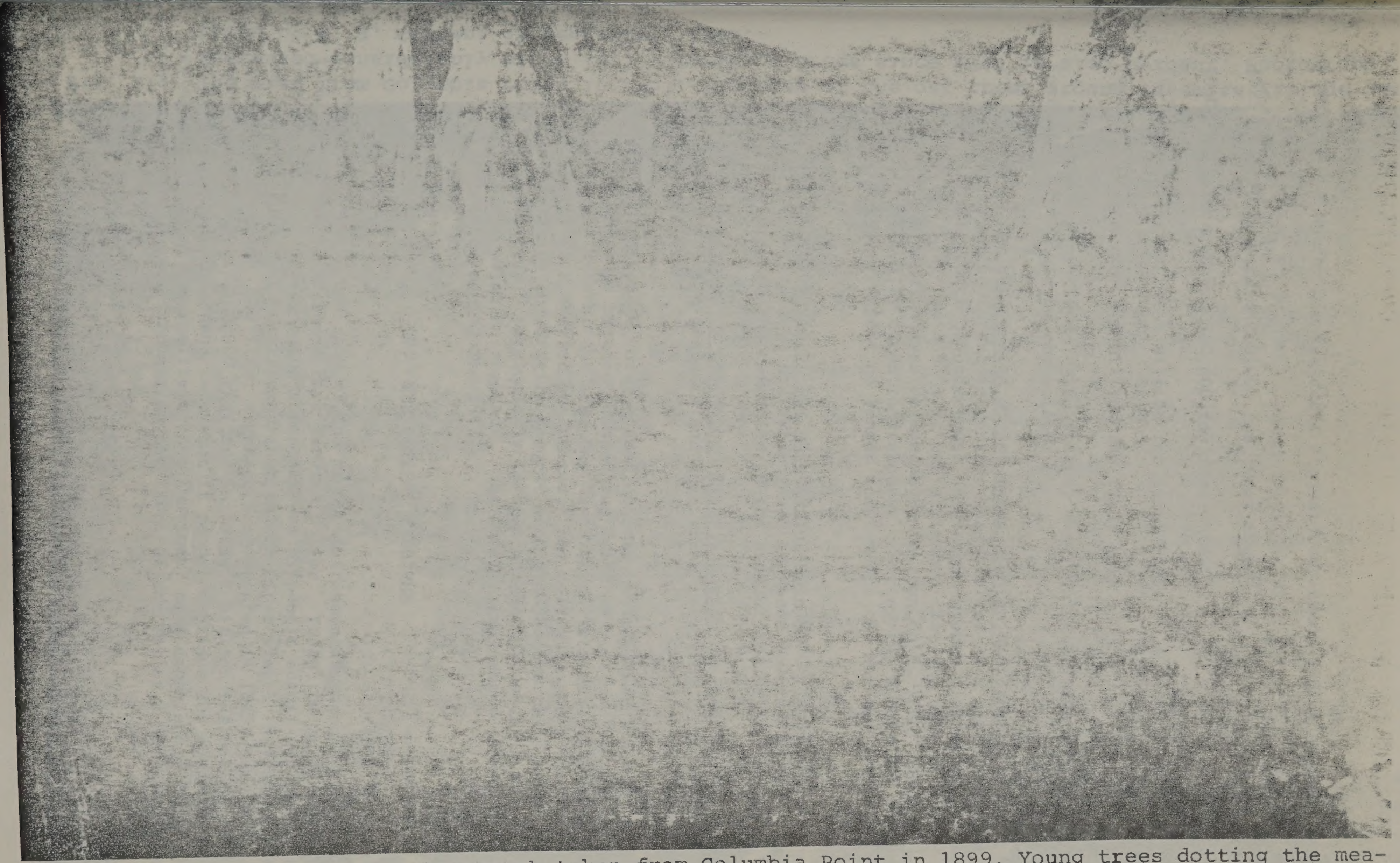


Fig. 15. A remarkably clear photograph taken from Columbia Point in 1899. Young trees dotting the meadows are clearly visible as are fences enclosing portions of the meadows. The pre-white man conifers are plainly visible above the stands of black oak and young trees. Photo by H. G. Peabody. Print from N.P.S. copy negative made by R. H. Anderson.

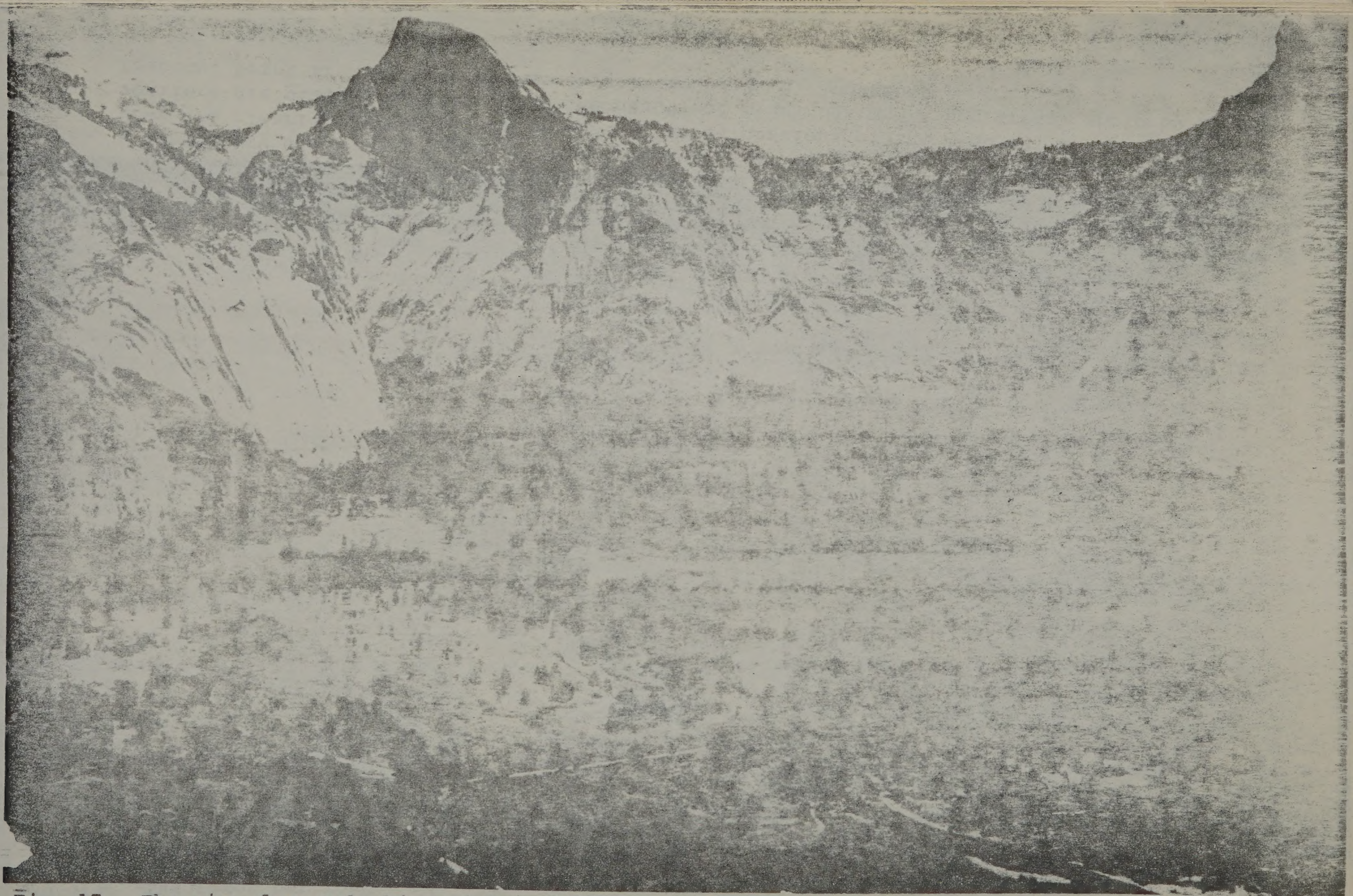


Fig. 17. The view from Columbia Point in 1961. The size of the oak trees around Yosemite Village has increased considerably since 1899. Growth of trees since 1943 is also evident. Photograph taken by R. P. Gibbens in September, 1961.

1923 - Hetch-Hetchy Dam-Reservoir Project completed by City of San Francisco.

1925 - Visitors exceed 200,000 for first time.

1940 - Visitors exceed 500,000 for first time.

1954 - Visitors exceed 1 million for first time.

1967 - Visitors exceed 2 million for first time.

With settlement and "Park" status, many ecological changes occurred. Four of these should be emphasized:

1. With the suppression of the annual Indian and other fires, uninhibited forest succession has resulted in a rapid increase in the growth of underbrush and second growth pine and cedar trees. By the 1890's it was estimated that the area of clear open meadowland was reduced by more than half. The "openness" of the Valley began to disappear creating the situation "whereby the Valley forest no longer complements the scenery but obscures it."
2. With the removal of the natural moraine dam (by explosives) in the lower Valley, the water table has been lowered thereby contributing to the reduction in the size of the moist meadows.
3. Stabilization of the Merced River's course has reduced the number of attractive meanders and open areas resulting from meander formation.
4. Man has grazed, over-grazed, plowed, cultivated, drained, ditched, dammed, cut, blasted, dumped and built on portions of the Valley floor. Much of the area has "recovered" from earlier disruptions. As the Park Service has stated, "The Valley is not a sanctuary for a delicate and fragile natural ecology, yet its resiliency has limitations," particularly in view of the increasingly severe human population pressure. The adverse influences of man need attention during the 1970's.

V. THE CURRENT PROBLEMS

We have considered some of the major environmental changes resulting from many years of National Park Service policy. Today the problem is people. At what point do the sheer numbers of people engulf and diminish the very features which attracted them in the first place? Reviewing the figures once again: the first sightseerers appeared in 1855; the first automobiles in 1913; 100,000 visitors in 1922; 1 million in 1954; and 2 million in 1967. The trend is up but it cannot continue for much longer without destroying the quality of the "national park experience" and without destroying the environment on the floor of the Valley. Many sensitive visitors are profoundly disappointed by the automobile and campground crowds, noise and clutter. Without significant additional policy changes in the immediate future, the result will be a Sierra Nevada equivalent of Central Park, Rock Creek Park or Golden Gate Park.

Fortunately, the National Park Service recognizes this need for policy review. The twenty miles of public roads within the Valley, seven camps, Lodge, Hotel, Camp Curry, Village and other facilities are being re-examined and restudied with a fresh point of view.

VI. SOME NEW MANAGEMENT POLICIES

Within the last two years the National Park Service has instituted four promising changes:

1. A system of one-way roads has been developed in the upper (eastern) end of the Valley, greatly improving the circulation pattern as well as the quality of the motoring experience. This concept should be extended to most of the roads on the floor of the Valley.
2. Limitations have been exercised on campground occupancy. For the first time, an attempt is being made to control the number of people using specific campgrounds to prevent excessive crowding and unpleasant camping conditions. A start has been made, but not until all the campgrounds are unitized and a reservation system instituted will the problem be solved.
3. The firefall from Glacier Point has been cancelled, thus eliminating an entertainment feature which was out of place in a National Park. The firefall was a tradition difficult for many Yosemite aficionados to dispense with, but the Park Service is to be commended for this positive change of policy.
4. New facility design criteria have been instituted.

VII. THE APPROACH OF THE NEW MASTER PLANNING TEAM

Most hopeful, however, are the preliminary recommendations of the new (1967-1970) Yosemite Master Planning Team Study. With respect to the Valley, the study has considered: (1) the concept of human carrying capacity; (2) the removal of the automobile (from the Valley, not other sections of the Park); (3) new transit systems; (4) the removal and relocation of National Park Service and Concession support facilities; (5) active ecological management of the Valley floor.

In attempting to solve the major problems within the Valley, the Master Planning Team, therefore, rejects the long-term prospect of rationing visits based on the present pattern of roads and facilities. Instead, it attempts to reorganize the entire pattern of visitation and use for the late twentieth century. Let us consider some of the far-reaching proposals.

Carrying Capacity

Carrying capacity is defined as "the number of visitors who can be accommodated in the Park on a given day without damage to the resource or lowering the quality of the visitor's experience." Based on enormous management experience, the day use carrying capacity figure for the Valley has been calculated at 40,000; with an overnight capacity within the Valley at 12,500. (Note: the 12,500 figure is included in the 40,000 total as overnight users are also day users.) The proposed 12,500 overnight users would be divided almost equally between campers and the users of the Hotel, Lodge, and the Camp Curry cabins.

Three general types of visitors are planned for: (1) those who will wish to tour the main features of the Valley in several hours; (2) those who remain in the Valley for an entire day and perhaps a portion of the evening; (3) the visitor who remains overnight and for two or more days.

Some other figures are significant. The out-of-state visitor presently constitutes about 25% of the total. Day use is increasing from approximately 35% in 1953 to 55% in recent years. There has been a lessening of the average length of stay, which for Valley campgrounds has decreased from over one week in 1946 to about 4 days at present. The corresponding figure for overnight accommodations is now below 1.9 days. The primary reason for the increase in day use is the limitations placed on campground acreage and overnight facilities within the Valley.

Special attention has to be given to the once in a lifetime visitor and the out-of-state visitor. Those Californians who use the Valley as a regular recreational area (often as a regional park) or merely as an escape from the crowded and polluted cities will have to be brought under more positive control.

The Removal of the Automobile

Primary access to Yosemite Valley has been almost entirely by private automobile; this pattern is likely to continue in the immediate future. However, the floor of the Valley has a carrying capacity beyond that which can be served by automobile access. Most of the congestion and unpleasantness results from the automobile; the lineups, noise, fumes and other esthetic disturbances all contribute to diminish the Valley "experience" for many visitors. The most significant change proposed by the Master Planning Team is the replacement of pleasure driving --- "a dubious pleasure on peak days" --- with an attractive, convenient transit system. This will take a number of years and considerable funding.

A New Transit System

The Master Planning Team has proposed development of a new transit system to take visitors to all points of interest in the Valley now accessible by private automobile. To be an improvement, the new system must be: (1) esthetically pleasing, (2) quiet, (3) safe, (4) relatively inexpensive, (5) clean and comfortable, (6) capable of frequent service, (7) capable of transporting goods and services as well as people, (8) developed on a "human scale." In addition, the right of way must not become an ecological barrier within the Valley. A miniature electric railway has been considered, but no operational system exists today which meets all of these criteria. Several designers and firms are working on concepts compatible with the all important consideration, making possible a "national park experience." Several years will be required to develop this most desirable system.

A well-designed automobile collection point is envisioned in the Big Meadow area, an ideal location about 4 miles west of the Valley. The proposed transit system would originate at Big Meadow. The development of hiking paths, bridal trails and bicycle paths would also be undertaken with separations from the transit system.

Relocation of Support Facilities

Almost all of the staff housing for the employees of the National Park Service and the concessioners and the associated maintenance facilities would be relocated at the Big Meadow site. An esthetically superior new town would, in fact, be created in Big Meadow basin. It would serve staff and visitors and would make possible removal of all the Valley's non-essential facilities and services. Such a new town development would free considerable acreage for open space, new campgrounds off the Merced River flood plain (replacing most of the unsatisfactory present ones and other visitor use facilities desirable in the Valley itself).

The above proposals will probably require implementation over a decade and considerable Federal funding. During the interim period, the automobile will have to be brought under more positive control and supplemented with a Valley-wide shuttle system, perhaps "elephant trains" or slower electrically-propelled elongated touring cars (similar to the Yellowstone vintage of 1939). Diesel buses would be a disaster. The advantages of enjoying Yosemite Valley without the use of a personal car will have to be vigorously promoted.

Ecological Management

The Team further proposes manipulating the area's ecology to "create an illusion of naturalness" through several field projects:

1. Re-establish a more open vegetation pattern like the 1851 Valley floor mosaic to liberate thereby the scenery from the dense stands of new-growth forest.

2. Maintain and extend the large undeveloped open meadows.

3. Preserve the attractive, open Black Oak woodlands adjacent to the meadows.

4. Perpetuate Mirror Lake as a scenic feature; the lake has been artificially maintained for over 75 years.

5. Re-establish portions of the Merced River to appear as a free-flowing river by removing selected rip-rap and dikes and by removing campgrounds from its floodplain.

6. Preserve small ecological units like the marsh near Happy Isles and portions of the Merced River bank; much of the latter is now trampled and denuded.

The Immediate Needs

After a quarter century of discussion and contemplation, the National Park Service is now moving toward resolving the problems of Yosemite Valley. An enormous funding program will be required in order to make the proposed changes --- in order to save the popular Valley from desecration by the internal combustion engine. During the interim period the following will need attention:

1. The present investment will have to be better maintained and policed. Crime is increasing in the Park in a spectacular way, particularly among detached, roaming younger people; there is an almost predatory young group present during the warmer months. A critical need exists for substantial numbers of summer Ranger (police) reinforcements: 50 - 100 men, possibly even more to protect the Park and other visitors.

2. The present campgrounds should be managed on a priority basis to effectively control overnight visitors. A camping reservation system should also be instituted, perhaps in cooperation with the California State Park System which has recently instituted its own system.

3. The waste disposal system within the Valley requires extensive improvements costing approximately $500,000. At present raw sewage may have to be released into the Merced River during critical flood periods.

4. The system of one-way roads should be extended to the entire Valley as soon as possible during the next two years.

5. A major human ecology exhibit should be developed at the Visitor Center. The exhibit should deal with impact of people on environments, including precious environments like the Valley floor; it should also relate the park to the environment from which the visitor comes. Tremendous educational potential exists.

We often underestimate the general public. People will support enlightened park programs and significant changes if a thoughtful explanation is provided --- and if the alternatives to responsible management are outlined.

VIII. CONCLUSION

The National Park concept is an inspiration to civilized nations and individuals. For this reason the very highest standards must be maintained. F. Fraser Darling has stated it well: "The impacts of the internal combustion engine and the increase of leisure were not clearly foreseen and the National Park System is now suffering physically from the success of of public interest expressed as numbers of visitors . . . The terrain of a national park cannot be treated as a museum piece to be preserved behind glass. Some things are possible and some are not; compromise is necessary and inevitable, but it would be wise not to follow a policy of expediency."

LITERATURE CITED

This case study is not based on original research. The compiler particularly appreciates the original material used in this report which was provided by Mr. Ronald Mortimore and Mr. Robert Barbee of the National Park Service. The meetings with Mr. Lawrence Hadley, Superintendent of Yosemite National Park and his Assistant Chief Naturalist Jones and Mr. Stuart Cross, President of the Yosemite Park and Curry Company were invaluable in preparing the report.

1. Barbee, Robert, 1969. Resource Management Plan for Yosemite National Park (unpublished preliminary draft).

2. Darling, F. Fraser and Noel Eichorn, 1969. Man and Nature in the National Parks. Second Edition. The Conservation Foundation, Washington, D.C.

3. Eckbo, Dean, Austin & Williams (Environmental Planners and Landscape Architects). 1969. Yosemite Phase IV Relocations (unpublished).

4. Faustman, D. Jackson, 1969. Traffic Analysis for Master Plan Studies - Yosemite (unpublished).

5. Gibbens, Robert and Harold Heady, 1964. The Influence of Modern Man on the Vegetation of Yosemite Valley. University California, Agricultural Experiment Station, Manual No. 46.

6. Huth, Hans, 1948. Yosemite: The Story of an Idea. Yosemite Natural History Association.

7. Johnson, Warren, 1966. Rationing the Use of Yosemite Valley--A Practicum. School of Natural Resources, University of Michigan, (unpublished).

8. Mortimore, Ronald, 1969. Report of the Yosemite Master Planning Team (unpublished preliminary draft).

9. National Park Service, 1968. Administrative Policies for Natural Areas of the National Park System. U. S. Government Printing Office, Washington, D.C.

10. National Park Service, 1969. Yosemite, and other visitor pamphlets.

11. Yosemite National Park Staff, 1968. Yosemite - Background Information for the Yosemite Master Plan (unpublished).

12. Yosemite Park and Curry Company, 1969. Annual Report for 1969.

CASE STUDY NO. XVI

OFF-ROAD RECREATIONAL VEHICLE COMPOSITE

by

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INTRODUCTION

Off-road vehicular travel is a threat to the environment. One vehicle which leaves the road may leave only a faint trail over the vegetation, but if several follow, they may wear down vegetation to the extent it would be down-trodden, ultimately killing it. Wind and rains which follow create erosion by blowing and washing away the topsoil. The severity of erosion problems will depend upon the steepness of trails, type of soil, amount of wind and rain and the frequency of vehicular use. If vehicular use is stopped, recovery of the area depends on the degree of damage and type of vegetation cover present. Considerations of vehicle damage must go beyond the immediate damage to vegetation. Wildlife, too, is threatened--both by loss of habitat and by noise disturbance. Finally, the loss in aesthetic values because of noise, exhaust and physical scars on the landscape must be considered.

This Report considers three types of off-road vehicles, all of which provide pleasure as well as transportation to a destination:

1. Motorcycles, Including All Two-Wheel Motor Vehicles

Riders of such vehicles generally drive for entertainment and prefer steep topography and the challenge of hill climbing. Their greatest impact has been on desert vegetation and grassy hills with some damage in the chaparral.

2. Four-Wheel Vehicles

Jeeps with four-wheel drive are a problem in high mountain meadows of California. Dune buggies, as the name suggests, are driven on sand dunes and desert areas where driving and racing are little impeded by vegetation.

3. Snowmobiles

This winter recreation reportedly has little effect on vegetation except for small trees in plantations. Occasional instances of wildlife harassment are known.

With the increase in popularity of off-road vehicles more and more pressure has been placed on the public lands permitting this use. Actual numbers of off-road vehicles are difficult to assess since many are not licensed. Nevertheless, California Motor Vehicle Department figures show a six-fold increase in registered motorcycles over the past decade: 60,771 in December 1958 to 395,693 by the end of 1968. Estimates of desert use within 150 miles of Los Angeles indicate that around 15,000 cyclists enter competitive events each year (Fig. 1), and 100,000 riders use the desert for non-competitive recreation. With the addition of some 250,000 spectators attending riding events, the number of people involved in desert motorcycling per year totals over 365,000.(22). Vehicle use is not limited to areas near

Fig. 1. Start of a cross-country motorcycle race in the Mojave Desert (northwest of Barstow, California). Over 200 motorcycles are visible here. On long-distance races, it becomes difficult for riders to determine the route, so piles of old tires are ignited to designate the course. Noise, fumes and dust are short-term effects, while vegetation loss is longer lasting. BLM photo, 1969.

cities. Many owners are willing to transport their vehicles hundreds of miles in pursuit of their hobby (Fig. 2). On many weekends, the equivalent of small towns spring up in desert areas (Fig. 3). In addition, new types of vehicles with greater power and traction permit access to more remote areas.

Off-road vehicle use has caused damage to the environment on both Bureau of Land Management (over 16 million acres) and Forest Service (20 million acres) lands in California. Problems on BLM lands have been greater, furthermore, this agency has little authority for controlling use. USFS problems are increasing, but the potential for controlled use does exist under Secretary of Agriculture Regulations 1/ backed by Congressional authority. Because of these differences in severity of damage and existing authority, our treatment of off-road vehicle effects is in two parts: lands under BLM control and lands under USFS control.

I. OFF-ROAD VEHICLE PROBLEMS ON BLM CALIFORNIA LANDS

a. Recitation of the Facts

In the Panoche Hills area of western Fresno County, California, motorcycle use has increased greatly since 1967 (Fig. 4-6) and has resulted in up to 60% loss of vegetation in a 1200-acre intensive use area (28). Cyclists seeking hill climbing and cross-country travel routes began frequenting private lands bordering the Panoche Hills around 1960. As use increased, conflicts developed between cyclists and owners who grazed their sheep and cattle. In late 1967, cattle grazers prohibited vehicle use on their land and thereby blocked access to the enclosed Panoche Hills public land. Armed guards were hired to enforce these restrictions. Continued conflicts between cattlemen and cyclists prompted Sheriff's officers to direct cyclists to the Panoche Hills via an open access road (25). In the Panoche Hills cyclists confronted cattlemen and sheepmen who held grazing privileges on these public lands. In addition, introduction of cyclists on the public land provoked the Central California Trail Riders Association to complain of cycle damage to their 14-mile trail (used in 1967 and 1968) by a cycle meet involving about 300 vehicles (25).

In attempting to control the vehicle use, which by Spring of 1969 averaged 500-1500 off-road vehicles per weekend, (14, 24), the BLM held meetings with local law enforcement officers, land users, county officials and motorcycle groups to work out a solution. Cyclists demanded full use of the area and felt they had the right to unrestricted travel (13). By authority of the Secretary of the Interior regulations on off-road vehicles the entire area was closed for two months during the peak grazing and nesting period (Apr. 18 - Jul. 7, 1969) while a management plan was devised to restrict vehicles to specific areas and trails. Closure was well

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1/ 36 C.F.R. -- Parks, Forests , and Memorials (1968).

2/ 43 C.F.R. "Chapter II - Bureau of Land Management, Department of the Interior Outdoor Recreation, " (1969).

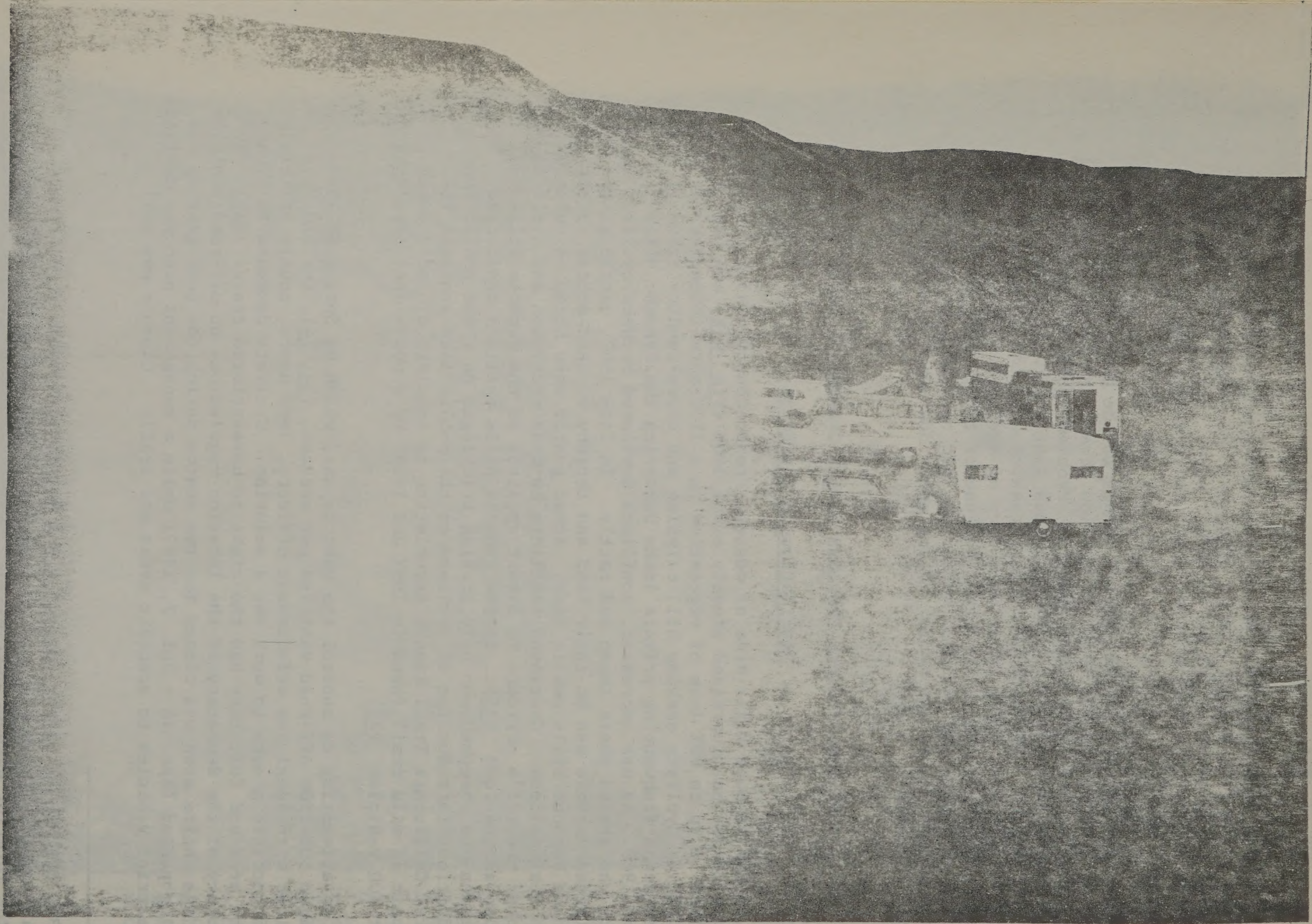


Fig. 2. Dune buggy enthusiasts transport their vehicles great distances for recreational outings. Here one truck hauls vehicles; a trailer to the left held 2-3 more. Dumont Dunes, southeast of Death Valley Monument, California. BLM photo, November, 1969.

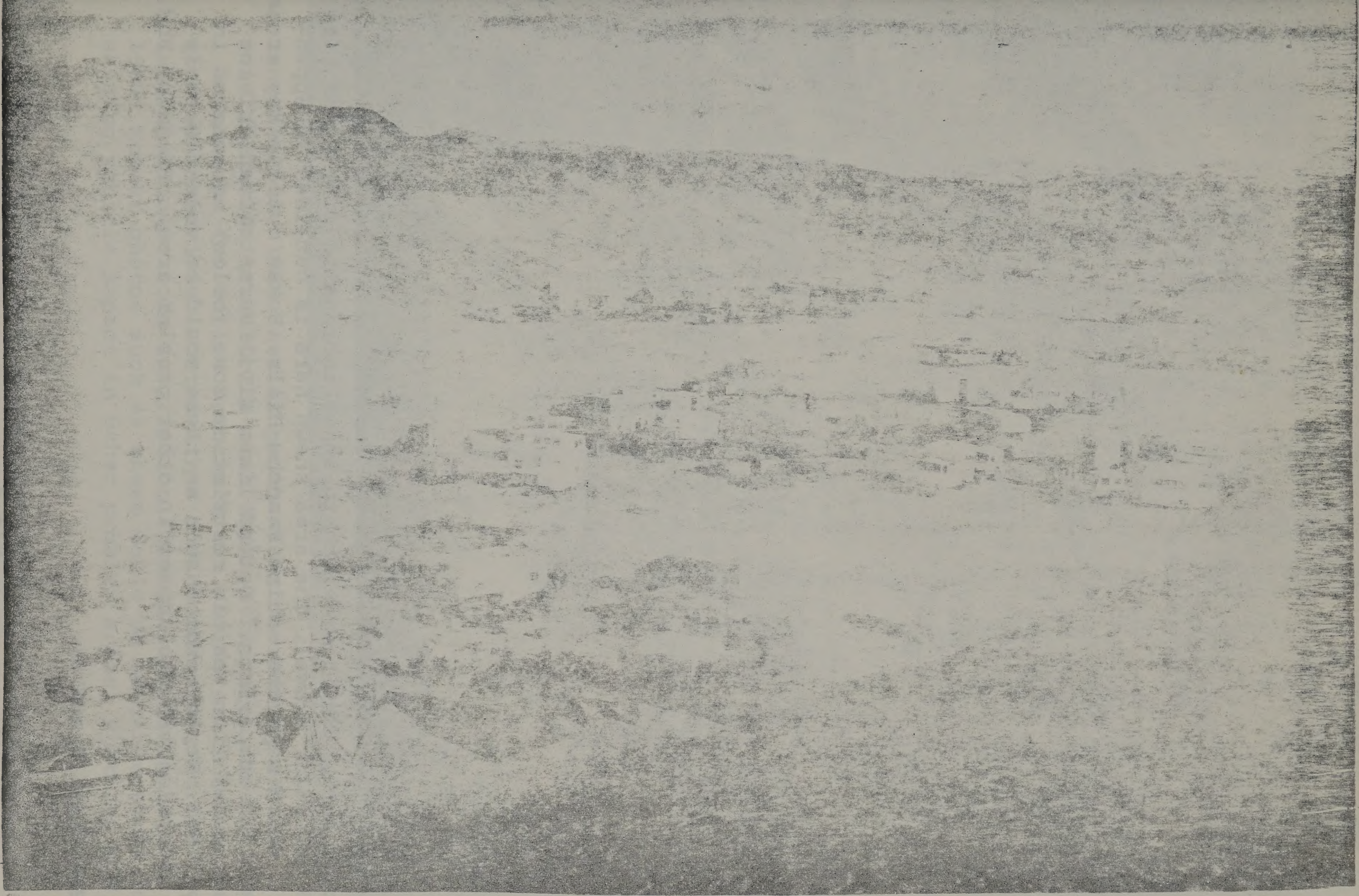


Fig. 3. A spontaneous campground in the Dumont Dunes. No facilities are provided, yet camps like this often spring up wherever a meet or rally is held. Sanitary facilities are often brought in by clubs sponsoring the event, but sewage is dumped locally (7). BLM photo, November, 1969.

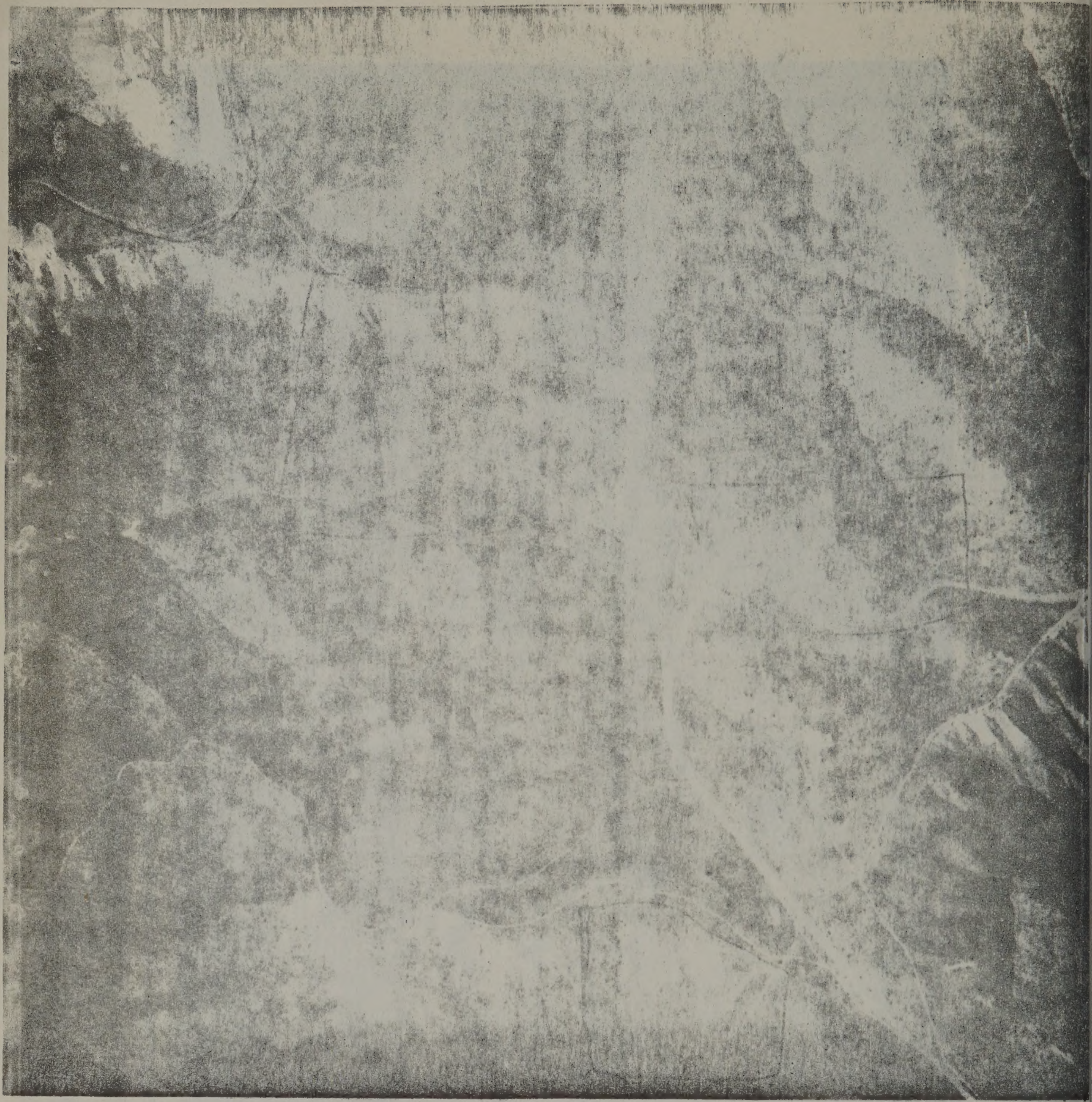


Fig. 4. Panoche Area, 1967, aerial photo shows increasing effects of off-road vehicular travel. The area shown here is outlined in Appendix 1 which maps the entire Panoche Hills. Boxes outline key areas of use for comparison.* Dotted lines divide unrestricted driving area (above) from vehicle restriction zone (below) as enacted in July, 1969. Repeat photos such as these would be valuable tools for assessing vehicle impact in other problem areas. Photo by BLM.

* (See Figs. 5 and 6)

5. Panoche Area, 1968, aerial photo shows increasing effects of off-road vehicular travel. The area shown here is outlined in Appendix 1 which maps the entire Panoche Hills. Boxes outline key areas of use for comparison. Dotted lines divide unrestricted driving area (above) from vehicle restriction zone (below) as enacted in July, 1969. Repeat photos such as these would be valuable tools for assessing vehicle impact in other problem areas. Photo by BLM.

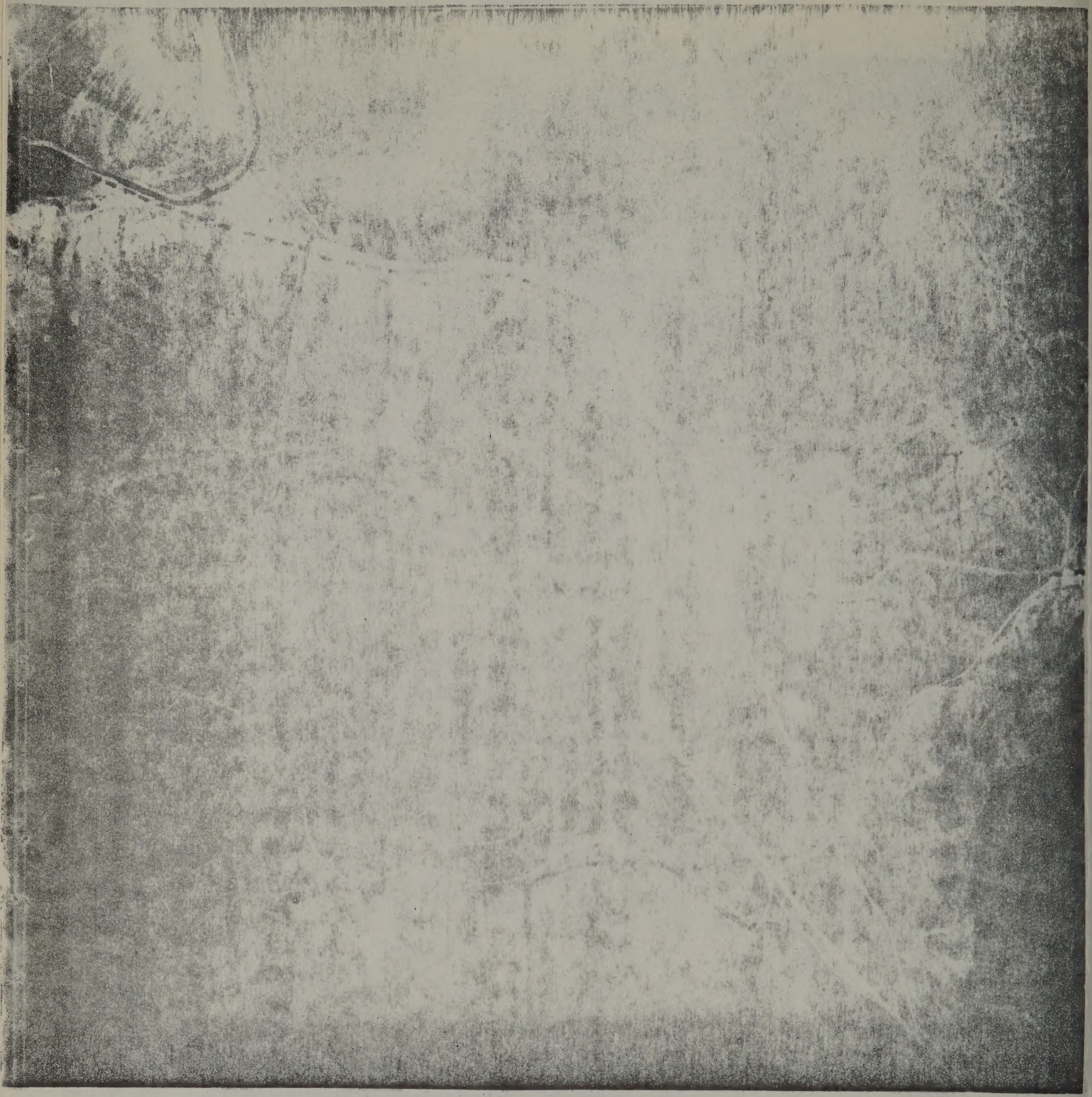


Fig. 6. Panoche Area, 1969, aerial photo shows increasing effects of off-road vehicular travel. The area shown here is outlined in Appendix 1 which maps the entire Panoche Hills. Boxes outline key areas of use for comparison. Dotted lines divide unrestricted driving area (above) from vehicle restriction zone (below) as enacted in July, 1969. Repeat photos such as these would be valuable tools for assessing vehicle impact in other problem areas. Photo by BLM.

publicized and effective. During this period a 1200-acre intensive use area was designated for unrestricted travel and a 14-mile trail was laid out for vehicles in the remainder of the 33,000 Panoche Hills area (Appendix 1). Several signs and markers were designed and posted delineating areas where vehicles are restricted. These plans were developed in conjunction with members of a newly-established BLM citizens committee, the Off-Road Vehicle Advisory Council (ORVAC), which includes representation of vehicle users and their opponents (Appendix 2). The BLM feels that extreme positions on both sides of the question have evolved toward the BLM policy of use under regulation (13). Continued meetings with ORVAC have considered practical aspects of regulation and administration of off-road vehicles. Their final recommendations will be available in February, 1970 (13).

Enforcement of the Panoche Hills management plan has been impossible because of lack of manpower. Cooperation of vehicle clubs has been obtained but the clubs represent only about 20% of the users (28). District Manager Delmar Vail estimates that about 70% of the visitors to the Panoche Hills do not heed signs which restrict vehicle travel.

A much larger area threatened by vehicle use is the 11 million acres of BLM-owned desert lands in California. Damage by motorcycles and dune buggies on deserts had become great enough by 1968 to prompt BLM to compile use-data for 19 selected desert recreation lands. The study published as The California Desert (23) was designed to inventory resources, establish multiple-use priorities and formulate a plan for action. There has to date been no attempt to close or regulate vehicle use on desert areas except for a request to vehicle clubs that permits be obtained before races, rallies, or other organized meets are held on BLM lands (21).

A visit to one of these 19 areas, the Redrock Canyon, located on Highway 14 near Ridgecrest, California, impressed us with the magnitude of vehicle overuse. Because of motorcycle damage to the desert hillsides and the heavy impact of camping on flat areas, the Redrock Canyon has been included in the "High Priority" list of BLM desert lands requiring immediate attention and plans for regulating recreation use (23). Cycle use in this area conflicts with several other recreational uses. During our visit, there were some visitors just seeking relaxation, others on cycles and dune buggies, and a third group target practicing with firearms--all within a few hundred yards of one another. Area Manager William Bright also noted the conflict with wildflower enthusiasts, photographers and painters (2).

b. Environmental Impact

(1) Panoche Hills

The impact of cyclists on vegetation was assessed and is reported in the BLM district report (25). Four hill-climbing areas ranging from 3.5 to 22 acres in size were estimated to be from 5 to 33 percent denuded. In addition, an 8-mile cross-country trail denuded 5.2 acres. Dominant vegetation here consists of annual grasses and some shrubs. The former are easily removed with repeated vehicle passage and offer no restriction to travel. The general loss of vegetation is seen in Figures 4-6, while more specific effects of hill climbing are shown in Figures 7-9.

This loss in vegetation obviously affects the land's utility for grazing, an important use of the Panoche Hills. The effect on wildlife is also apparent. The Panoche Hills is considered to be a prime habitat for chukar partridge, quail, doves and cottontail rabbit, all of which are hunted in the area. And, peak use by cyclists coincides with the nesting season (14).

Air quality is lowered by increased dust and noise caused by motorcycles. This pollution often inhibits use of the area by groups seeking other types of recreation.

In attempting to assess the damage to the watershed, BLM officials estimated soil losses in cubic yards per acre in the five study sites mentioned above. As soil is removed by wind and water, V-shaped gullies 2 feet deep and 5-6 feet wide can result (see Figures 8-9). An estimated 48 cubic yards per acre of soil were lost in a heavily used 3.5 acre hill-climbing area.

The scenic value of this area has decreased greatly because of off-road travel. Although the Panoche Hills were little used prior to 1967 (except for hunting), the need for larger areas available for "escaping" the city environment is increasing. This small area is close to population centers of 7 million people (28), and therefore can expect greater public pressure for other types of recreation. In the Panoche Hills, two of the least desirable qualities of city living---noise and dirty air---are present, making the area less attractive for the recreationist seeking peace and quiet.

The conflict to date has largely concerned cattlemen, sheep ranchers and hunters. Because of a 100-year history of domestic grazing, and a vegetation consisting largely of non-native annual grasses, the Panoche Hills cannot be considered wilderness.

(2) Redrock Canyon

The environmental impact in Redrock Canyon has been similar. Cycle hill climbing has denuded several hills of the area (Fig. 10-12). Examination of these photos shows that the pattern of shrubs is interrupted by cycle tracks, indicating that not only are understory annuals killed, but perennial shrubs are also removed.

High density camping in several areas has resulted in nearly 100% denudation of the annual grass understory (Fig. 13) with less loss of shrubs. The problem here is not camping itself but the inability to control camping. There are no restrictions as to where visitors increase in number and/or seek closer access to diminishing firewood supplies. Areas nearest access roads are virtually devoid of vegetation due to intensive use.

Fig. 7. A popular hill-climbing area in the Panoche Hills. BLM photo, March 3, 1968.

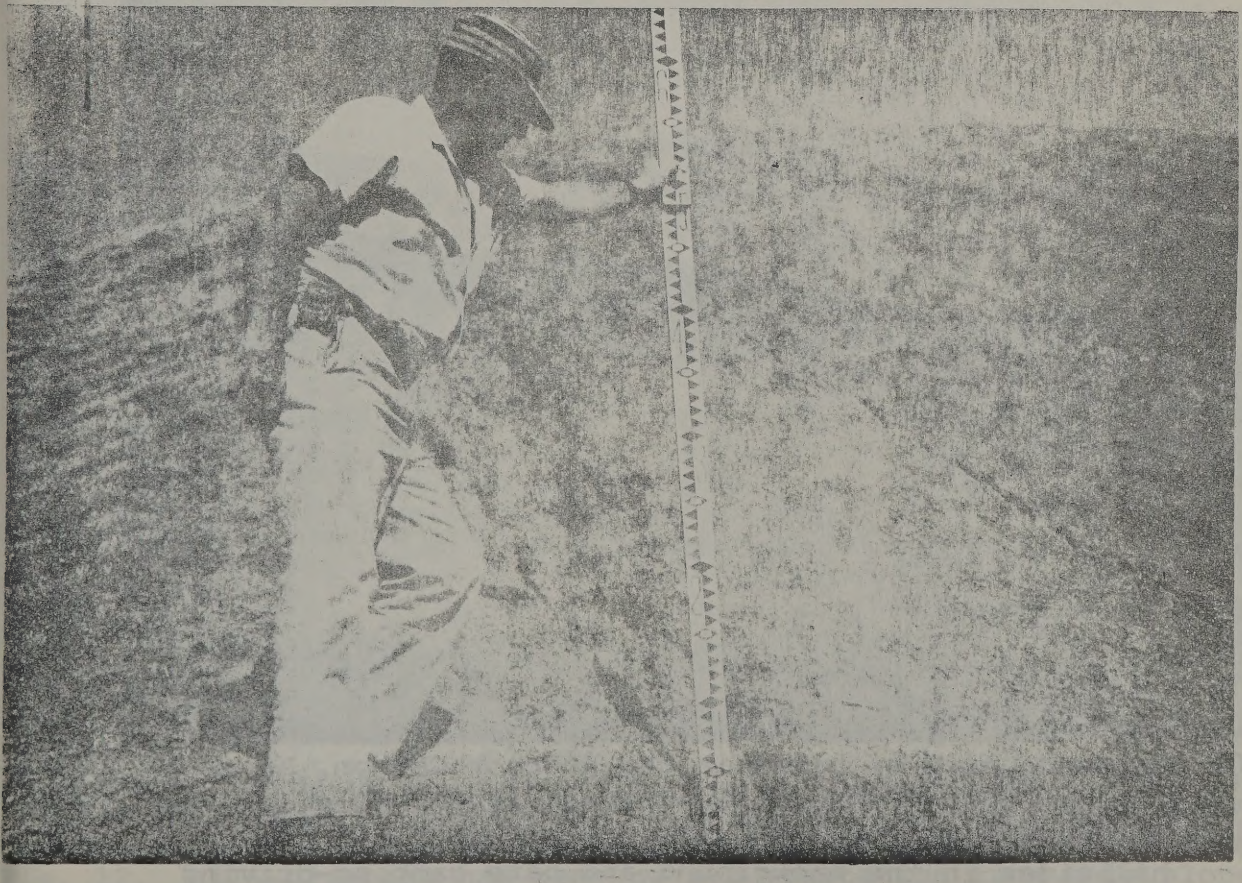


Fig. 8. Effects of trail use since 1960. Silver Creek area of the Panoche Hills, April 4, 1968. BLM photo.

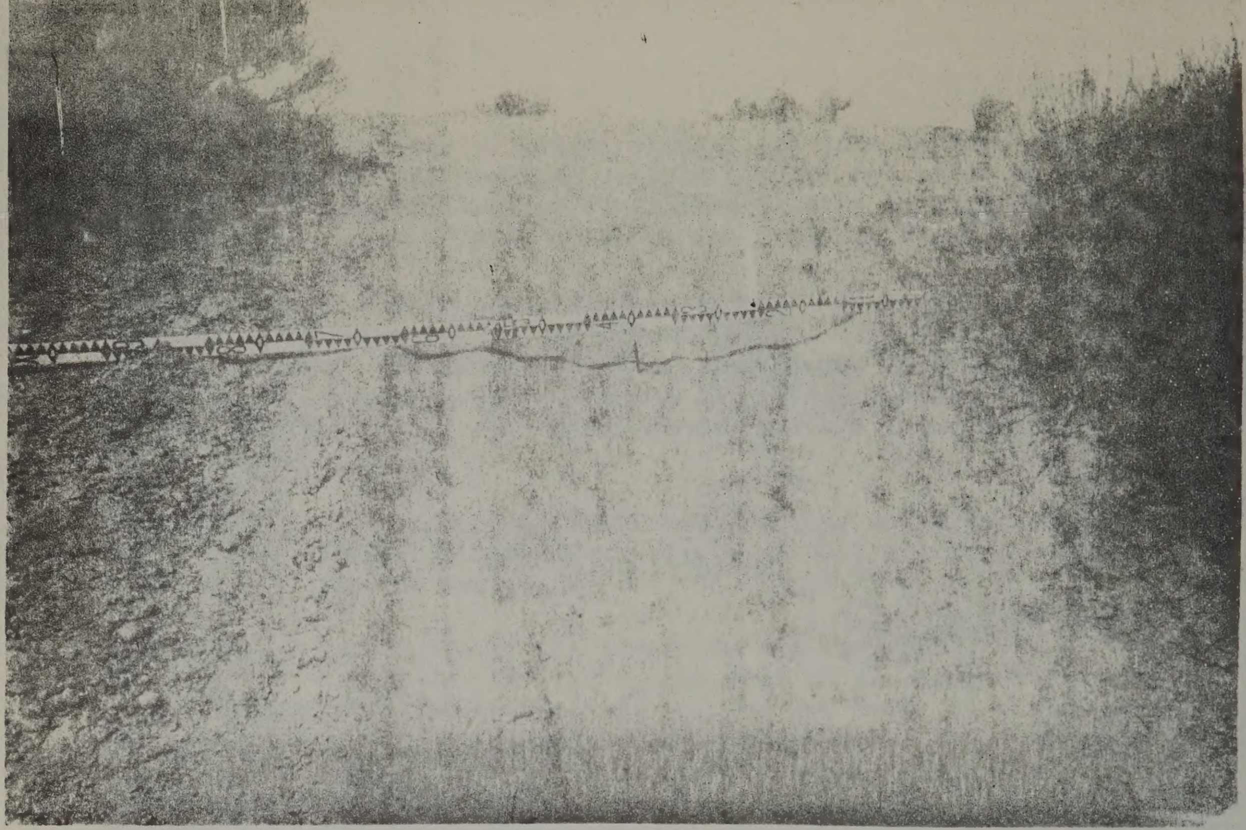


Fig. 9. Broad path resulting from 6 month's use (October, 1967 - April 10, 1968). BLM photo taken in the Panoche Hills.

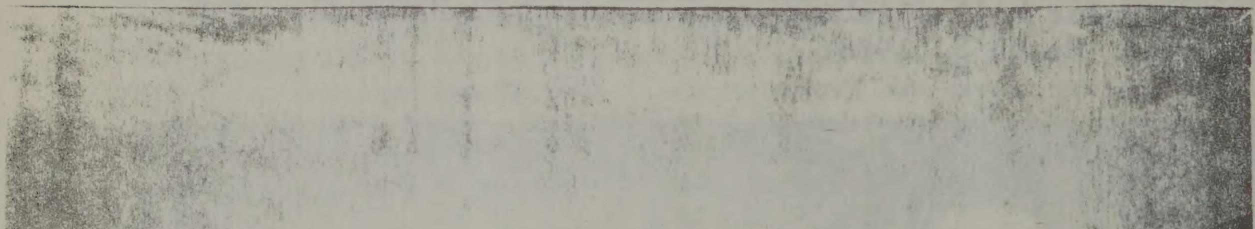


Fig. 10. Distance view of hills in the Redrock Canyon, on the western edge of the Mojave Desert (about 60 miles east of Bakersfield, California). Note the trails up the hillsides in the background and bare camping-driving area in foreground. December 6, 1969.

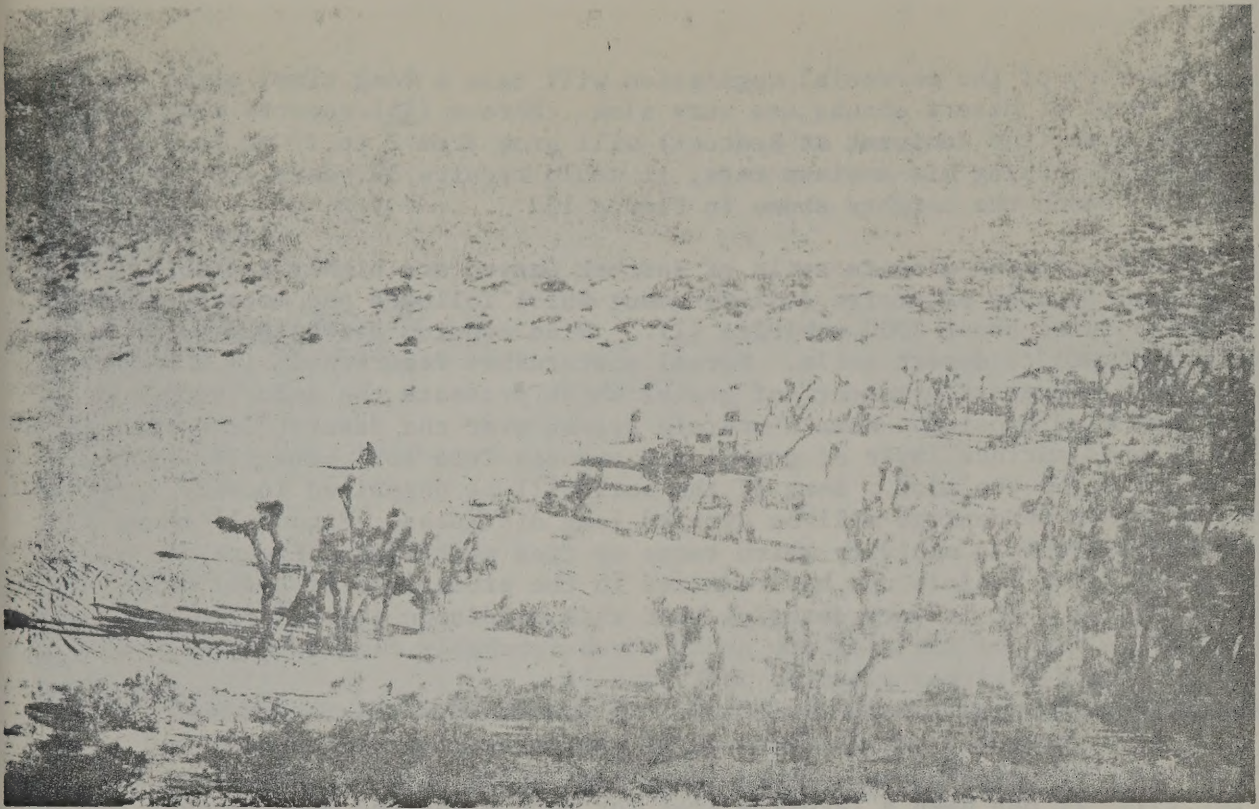


Fig. 11. This photo, taken to the right of Figure 10, indicates heavy use of a small stand of Joshua trees for camping. The understory grasses have been completely eliminated. December 6, 1969.

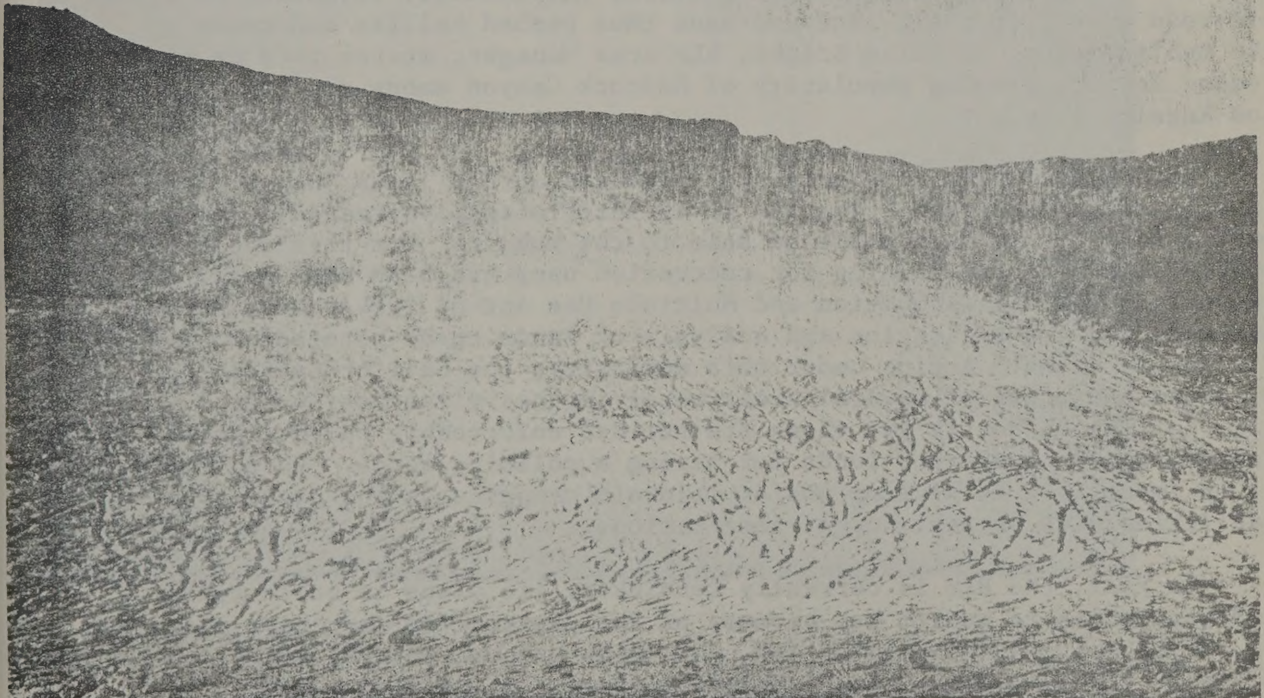


Fig. 12. Hill-climbing has removed all vegetation from this slope which is near an access road and camping area shown in Figure 11. Redrock Canyon, December 6, 1969.

Recovery of the perennial vegetation will take a long time, since growth rates of desert shrubs are very slow. Shreve (16) reports that creosote bush (the dominant at Redrock) will grow from 2 to 15 cm in three years. Using his maximum rate, it would require 30 years for shrubs to reach the heights shown in Figure 13.

The decomposed granite soils of Redrock Canyon are highly erodable. Figures 14-16 show extensive soil movement which followed one motorcycle event involving about 1500 vehicles (2). Wind erosion presents a serious hazard to desert soils. Normal undisturbed desert soil is covered by a "desert pavement" of gravel which protects the underlying soil from wind erosion. When a vehicle drives over the desert, it breaks through this surface layer of gravel and exposes fine soil material which is picked up by the wind. Some of the soil will be deposited locally, but a certain percentage will be carried long distances. Figure 17 shows the kind of vehicle activity which turns up fine particles. Figure 18 shows how heavy vehicle use has resulted in the production of small dune-like features. It is very doubtful that this condition existed prior to heavy use. Much of the sand now among shrubs probably came from the adjacent denuded slopes pictured in Figure 12.

Redrock Canyon is unique because of the presence of lakebed soils which have been exposed and eroded into interesting colored formations (Fig. 19). It has been a favorite area for people seeking many types of recreation. However, with heavy vehicle use the noise, dust and denuded hillsides are very objectionable. Accumulations of trash (Fig. 20) further detract from the scenery.

c. Problem Origins

Quite simply, problems have resulted from the unprecedented increase in off-road vehicles in the past decade. Furthermore, private landowners adjacent to metropolitan areas have become increasingly reluctant to allow off-road travel on their land and have thus pushed rallies and races to the public lands. William Bright, BLM Area Manager, states this as one reason for the growing popularity of Redrock Canyon among cyclists from the Los Angeles area.

But specifically, the origin of problems on BLM lands must be considered in a historical context. The BLM is an interim agency created to manage public lands until they could be sold to the public. For this reason, no consideration of or planning for recreation uses had been made until recently. The Classification and Multiple Use Act of 1964 charged the BLM with the identification and analysis of lands to be retained within its jurisdiction. Acting under this authority, the California BLM directed the study of several areas receiving heavy recreation use (22, 23, 25). But as yet there are neither enforceable rules concerning recreational use nor funds for hiring a policing force. Furthermore, it is impossible to develop and/or maintain campgrounds and sanitary facilities with present budget restrictions.

In fact, the BLM is currently rethinking its plans to build roads and open areas to public use because of the destruction they have witnessed

Fig. 13. This flat area, a few miles from Figures 10-11, is popular with campers. A few desert shrubs remain, but the understory vegetation has been removed by intensive vehicle use. December 6, 1969.

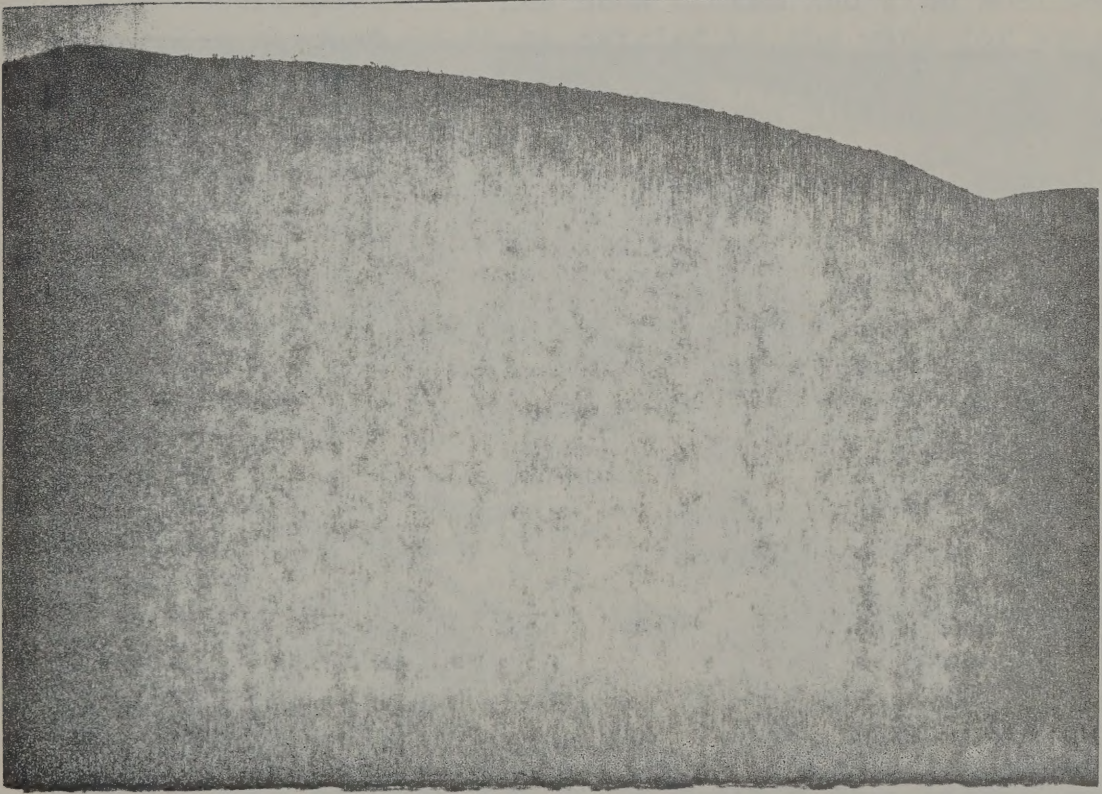


Fig. 14. This photo, along with the two following it (Figs. 15 and 16) show increasingly closer views of a cycle path coming down the hillsides. This particular trail was caused by one motorcycle event involving about 1500 cycles. The damage seen here occurred in one day during the spring of 1969. Taken near Redrock Canyon, December 6, 1969.

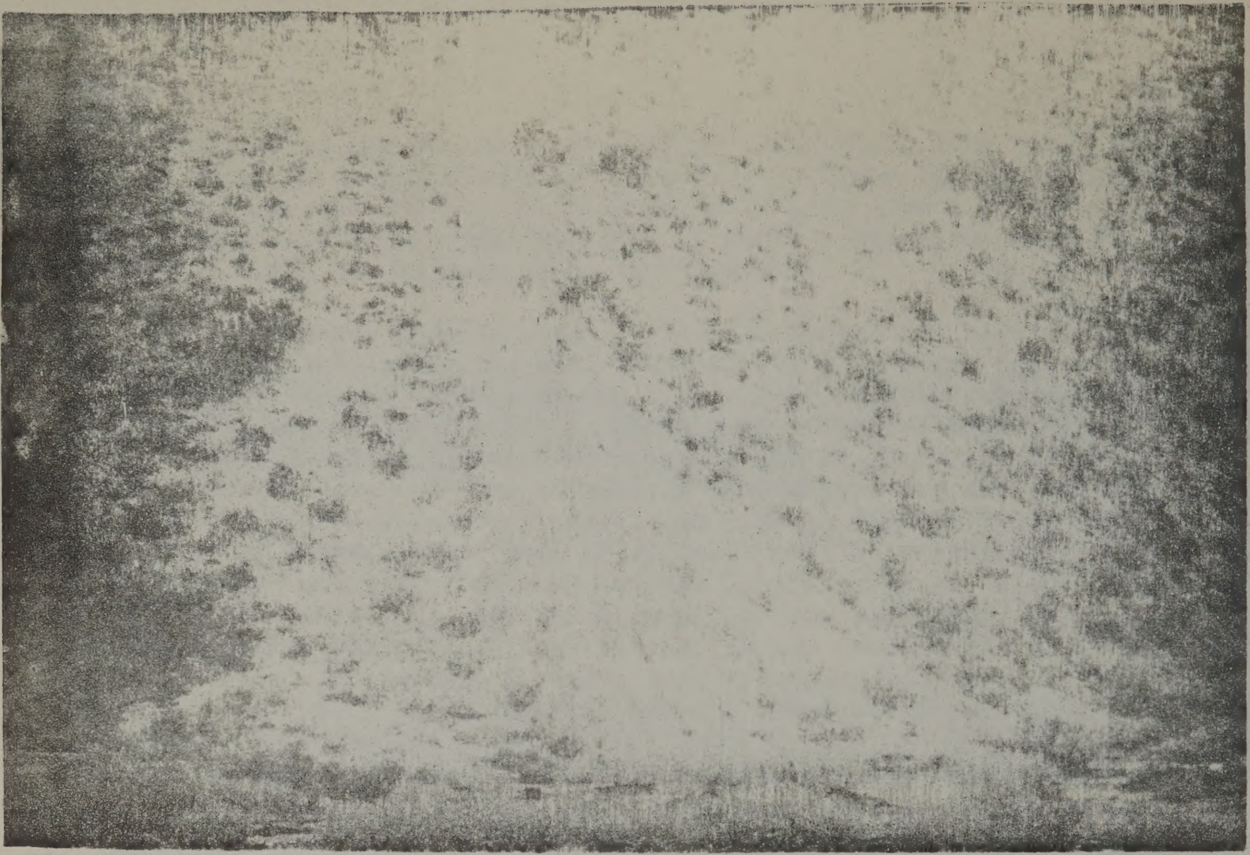


Fig. 15.

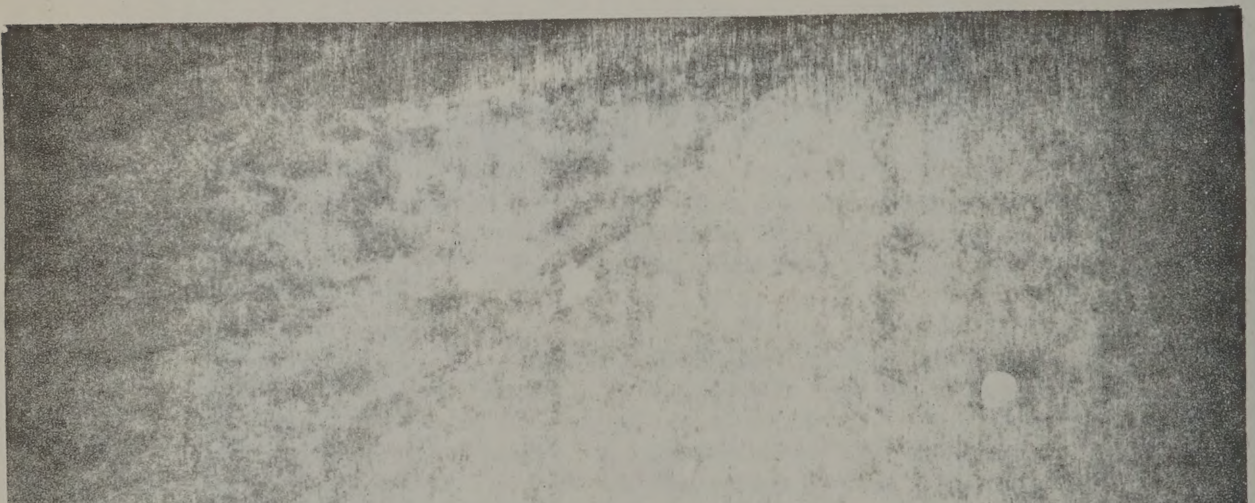


Fig. 16.

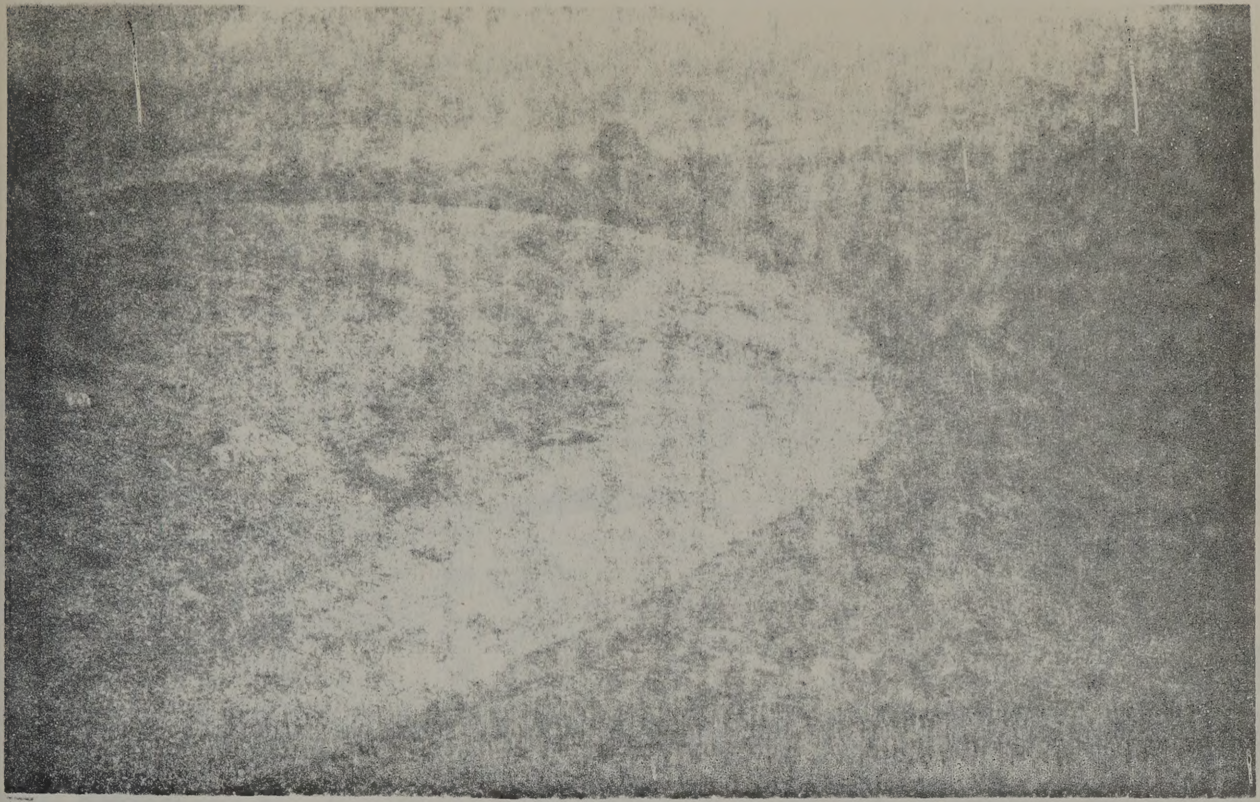


Fig. 17. This rut, about 3 inches deep, was caused by one motorcycle just before the photo was taken. The protective "desert pavement" has been broken and fine soil particles churned up to be carried by the wind (or water). Redrock Canyon, December 6, 1969.

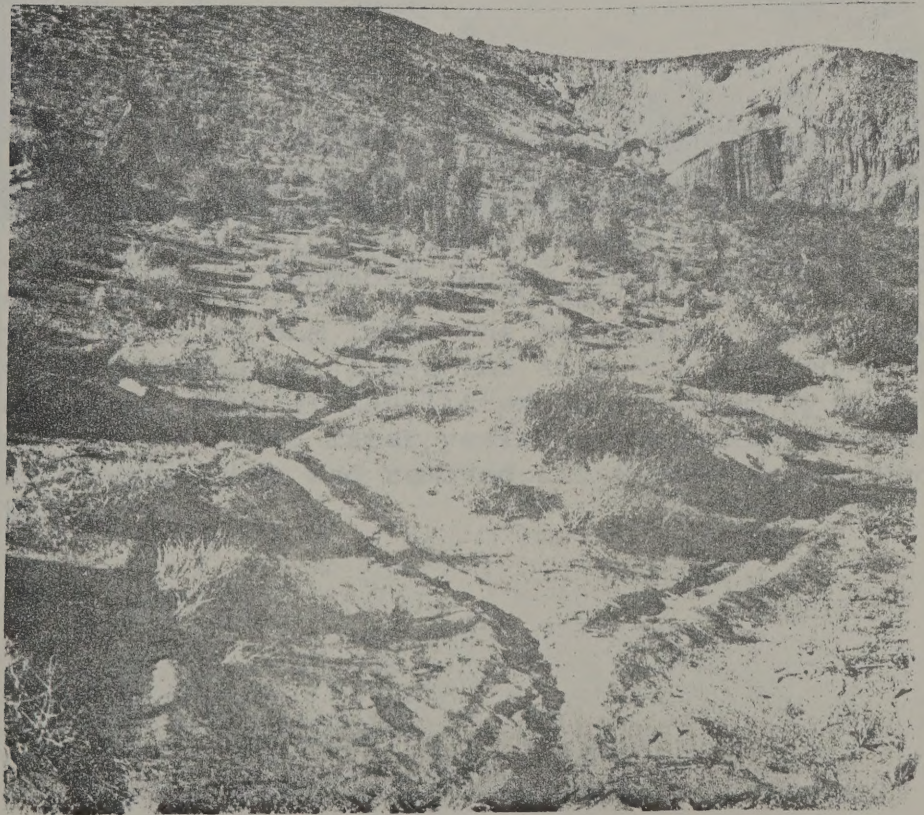


Fig. 18. Small dune-like formations where the desert soil is disturbed. Redrock Canyon, December 6, 1969.

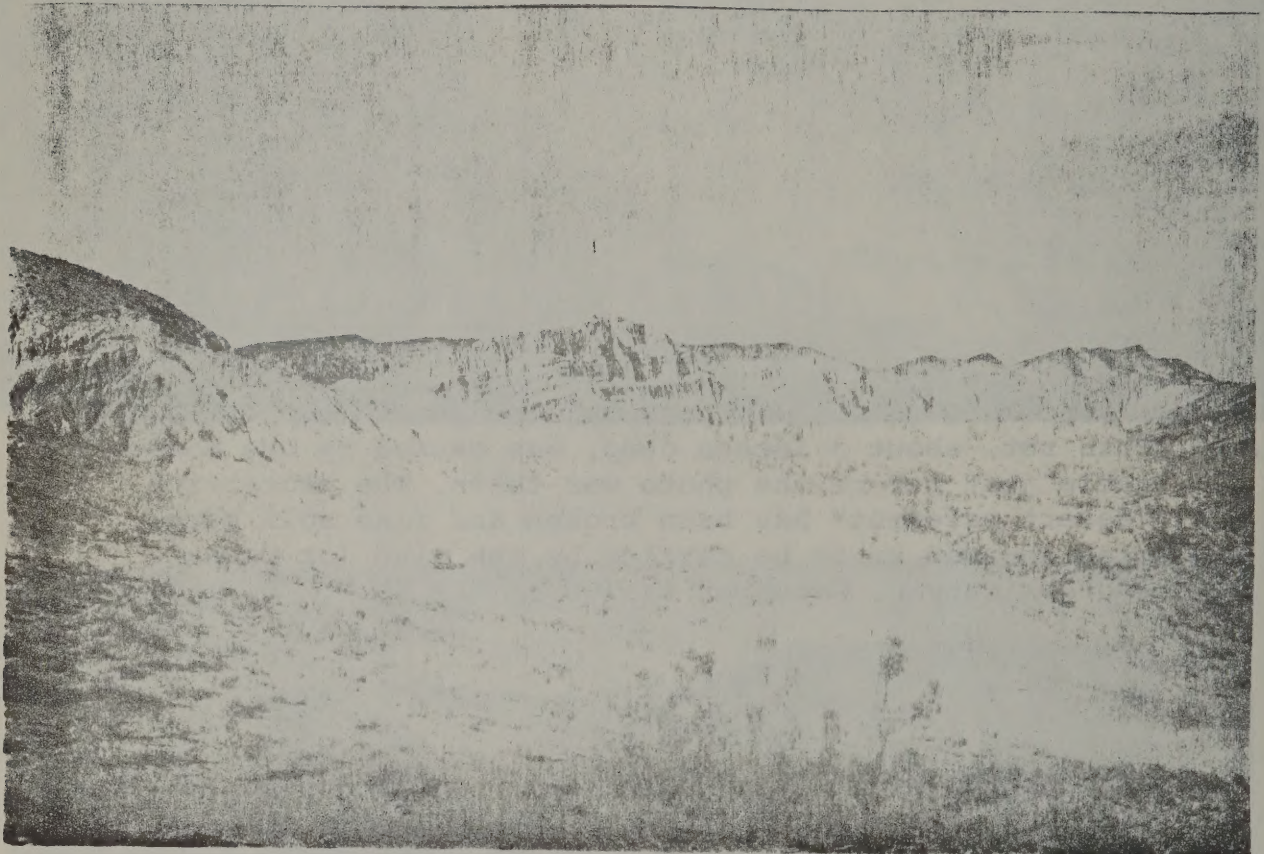


Fig. 19. These colorful lakebed formations give the Redrock Canyon its unique scenic value. December 6, 1969.

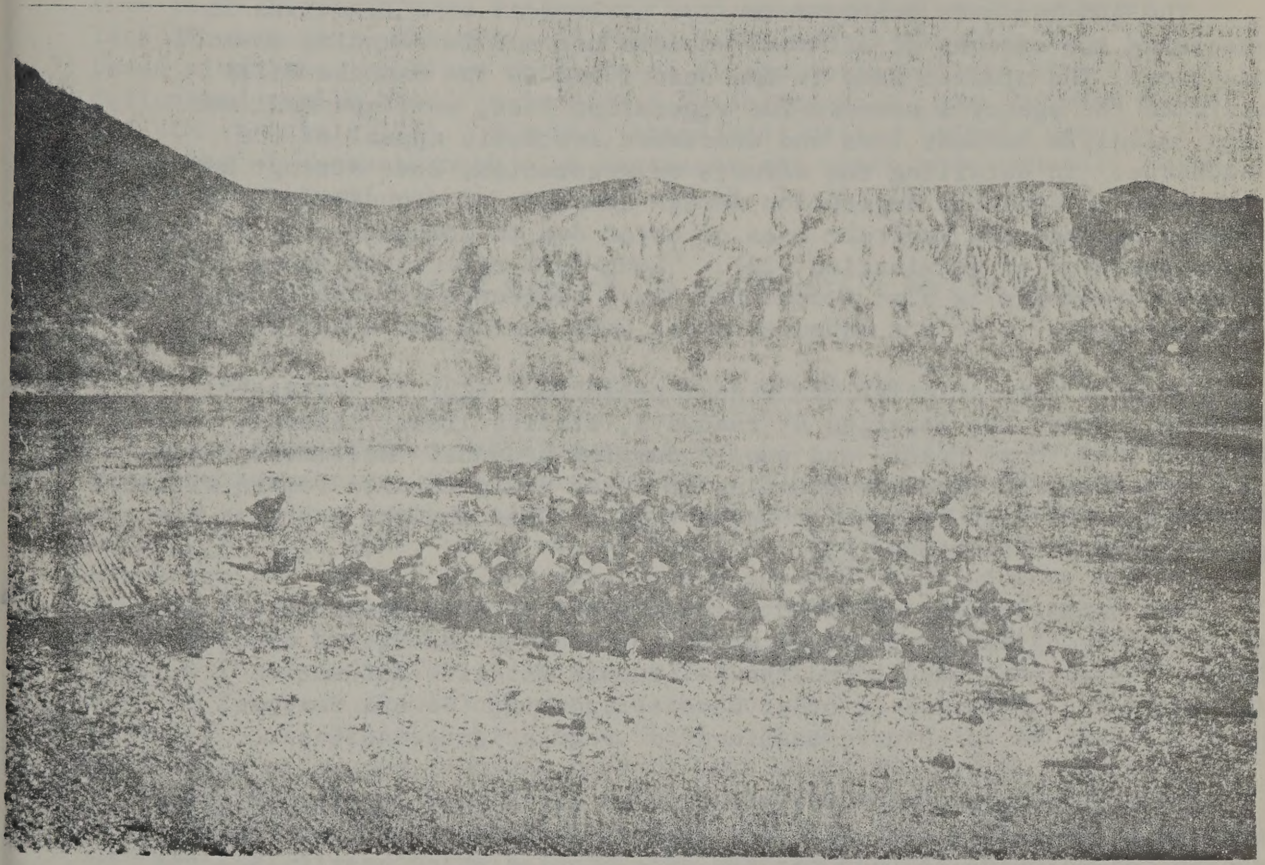


Fig. 20. Trash heaps such as this distract from scenic value. Since no receptacles are provided (due to lack of funds to maintain them), litter problems are serious. This particular heap lies on private land but has doubtless been deposited by visitors to BLM land. The accumlation represents one season's deposits, since the area was cleared of rubbish last year. Much of the litter gets buried by blowing sand only to emerge in later years, as occurred here after workers thought they had removed all former trash. December 6, 1969.

in the Panoche Hills after public access was obtained. The opening of new areas can only lead to greater problems if these new areas are not intensively managed (13).

d. Environmental Considerations and Alternatives

(1) Considerations

The BLM has made fairly extensive ecological considerations in assessing the effects of off-road vehicle use and in planning control measures. The studies made in the desert and in the Panoche Hills indicate the agency's concern for vegetation loss, soil movement and loss, wildlife habitat loss and decreased aesthetic appeal of the landscape. In detailing the effects on vegetation, some attempt has been made to separate vegetation damage into direct denudation by vehicle passage and indirect loss of cover due to compaction of the soil and prevention of germination (23). Long-term effects of damage to desert perennials is also a concern, since reference is made to still-visible tracks in desert maneuver areas used during World War II (23).

Concern for varieties of "visual pollution" (22) is expressed: vehicle tracks, the location of roadways, utility lines, mineral explorations, home tracts and public dumping grounds. Recommendations call for detailed land use planning in areas designated to remain within BLM jurisdiction as Recreation Lands (23). Some thought has also been given to noise pollution (25).

The establishment of ORVAC allowed input from representatives of several "ecologically-oriented" groups, including the Sierra Club, the Desert Protective Council and the California Wildlife Federation (Appendix 2). Policies of other Federal agencies (Forest Service, National Park Service) were examined for regulation guidelines.

Detailed management plans are spelled out in The California Desert (23) which advocates concentrating parked vehicles, laying out definite routes for motorcycles (but not for dune buggies which heavily use the Imperial Sand Hills), developing campgrounds and sanitary facilities and the recruiting rangers to supervise use. However, none of these plans has been attempted to date.

In the Panoche Hills, a minimal management plan involving restriction of off-road travel to a specified area and the marking of one 14-mile trail was attempted in July, 1969 (Appendix 1). Due to lack of power to enforce the regulations set forth, the plan has only been about 30% effective in controlling vehicle travel (28).

(2) Alternatives

The above studies are superficial in that they do not allow accurate prediction of future impacts. The BLM recognizes this inadequacy and recommends more intensive studies of such things as rate of soil movement, growth rates of desert perennials and possibilities of seeding to promote revegetation (23). But, data already gathered clearly document the direction of uncontrolled vehicle use on desert and other xeric vegetation as discussed under Environmental Impact.

The recommendations of the BLM (22, 23) seem well thought out and consistent with multiple use considerations. Unfortunately, at this time it is impossible to implement these recommendations because of lack of authority, manpower and funds. Because of the inability to issue citations, repeated attempts to direct motorcyclists back to designated trails have resulted in a "hide-and-seek" game between users and BLM officials (28). BLM has, therefore, relied largely upon education of users through club organizations which unfortunately reach only a minority of vehicle enthusiasts (3, 7, 13, 28).

II. OFF-ROAD VEHICLE PROBLEMS ON CALIFORNIA'S FOREST SERVICE LANDS

a. Recitation of the Facts

Conflicts between vehicles and other uses of National Forest lands first became serious in the late 1950's. Evidence of the growing problem are the closures which the Forest Service has imposed on National Forest Land (27). To date, two kinds of conflict have brought about these closures: 1) conflict with watershed protection arising from erosion damage; 2) conflict between vehicles and other recreational uses such as hiking and horseback riding. The first of these caused the Forest Service to close areas in the Sierra National Forest in 1958. The second type of conflict led to closures in the Los Padres National Forest near Monterey, California, beginning in 1961. Since these two early closures, management personnel in other forests have acted similarly. At present 6 of the 18 National Forests in California have vehicle restrictions on areas other than Wilderness Areas (27). In late 1969, about 16 percent of the total miles of trail in the California National Forests are closed to vehicle traffic (17). Two other forests, Cleveland and Tahoe, may have restricted areas within the next year (15, 10). In general, erosion damage has been the main consideration, but pressure from non-vehicle users and their organizations has played a role.

The Forest Service has been careful to keep the public advised of anticipated major changes in vehicle restrictions, and they have found that the vehicle users, through their organizations, are eager to make their preferences known (7). For example, prior to enacting vehicle restrictions, the Sequoia National Forest prepared and distributed a map showing suggested closures. In addition, a public meeting at Porterville drew about 150 people, most of whom were pro-vehicle and opposed to closure (7). This large response, according to Forester Leo Slattery (17), probably resulted from increased organization of vehicle enthusiasts following the closure of the Los Padres areas. On the basis of public opinions expressed at this and other meetings, the proposed Sequoia closure was modified and enacted in 1966. Since that time compliance has been relatively good (40-50 citations in 1969) (18).

A definite effort has been made to work with vehicle clubs in repairing and rerouting trails. Regional policy 3/ states that the Forest Service shall prescribe the route, and members of vehicle clubs shall supply free labor to build improvements.

Although vehicle use has been restricted in several areas, some additional situations are unresolved. A conflict has occurred between cattlemen and motorcyclists in the Descanso district of the Cleveland National Forest near San Diego. Evidence of the rancher's concern is a September, 1969 letter written by the San Diego County Cattlemen's Association and sent to State, Federal and County officials. The cattlemen feel that "land-use laws were not designed to cope with the ever-increasing motorcycle traffic" (11). However, no vehicle restrictions have been proposed.

In the Trabuco District of the Cleveland National Forest near San Clemente, vehicle damage has occurred in Los Pinos Potrero, a large grassy opening with scattered live oak trees. Most such potreros are privately owned and unavailable for public recreation. Because of its unique qualities, Los Pinos Potrero is being developed for camping and hiking (26). But vehicle use will have to be strictly regulated. Already the cross-country trails caused by spontaneous cycle recreation are resulting in erosion, and signs other regulatory measures have failed to eliminate off-road travel (Fig. 21).

In the same area, motorcycle use close to camp and picnic grounds has conflicted with non-cyclists who complain mostly of noise. Also, parking lots are filled with vehicles transporting cycles to the area, and this limits the use of picnic tables by other recreationists (6).

Throughout the Cleveland National Forest, motorcyclists have caused erosion by driving on steep and vertical trails, especially firebreaks. To date, the only control measures adopted are a few fences and signs prohibiting vehicles on specific trails and dirt barricades discouraging travel on firebreaks (Fig. 22). The latter are largely ineffective (6).

In anticipation of increasing vehicle use, some Forest Service officers propose that areas be set aside for the exclusive use of motorcycle and jeep (6, 8, 20, 21).

The specific cases cited above are representative of the more serious situations in National Forests, but many other problem areas exist. Most of the USFS officers in California feel that off-road vehicles present problems and are causing damage. Vehicle problems are by no means limited to California; they are increasing throughout the country. Private citizens and conservation interest groups are becoming aroused over vehicle-use problems (29).

3/ U. S. Forest Service Manual, Title 2300--Recreation Management, "Chapter 2351, General Undeveloped Areas." (R-5 Supplement No. 22, Sec. 2351.32a)(1968).

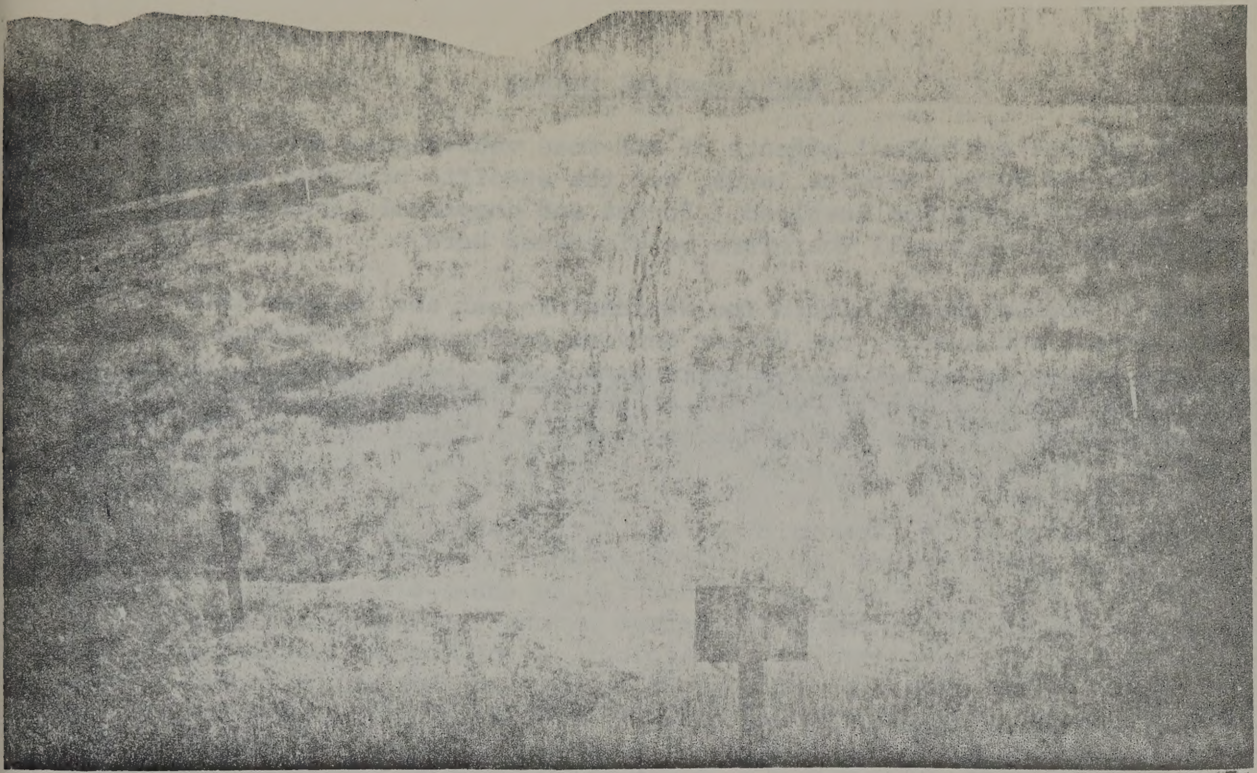


Fig. 21. Vehicle damage in Los Pinos Potrero, Trabuco District, Cleveland National Forest, California. Attempts to regulate travel by signs have failed to prevent damage. November 28, 1969.

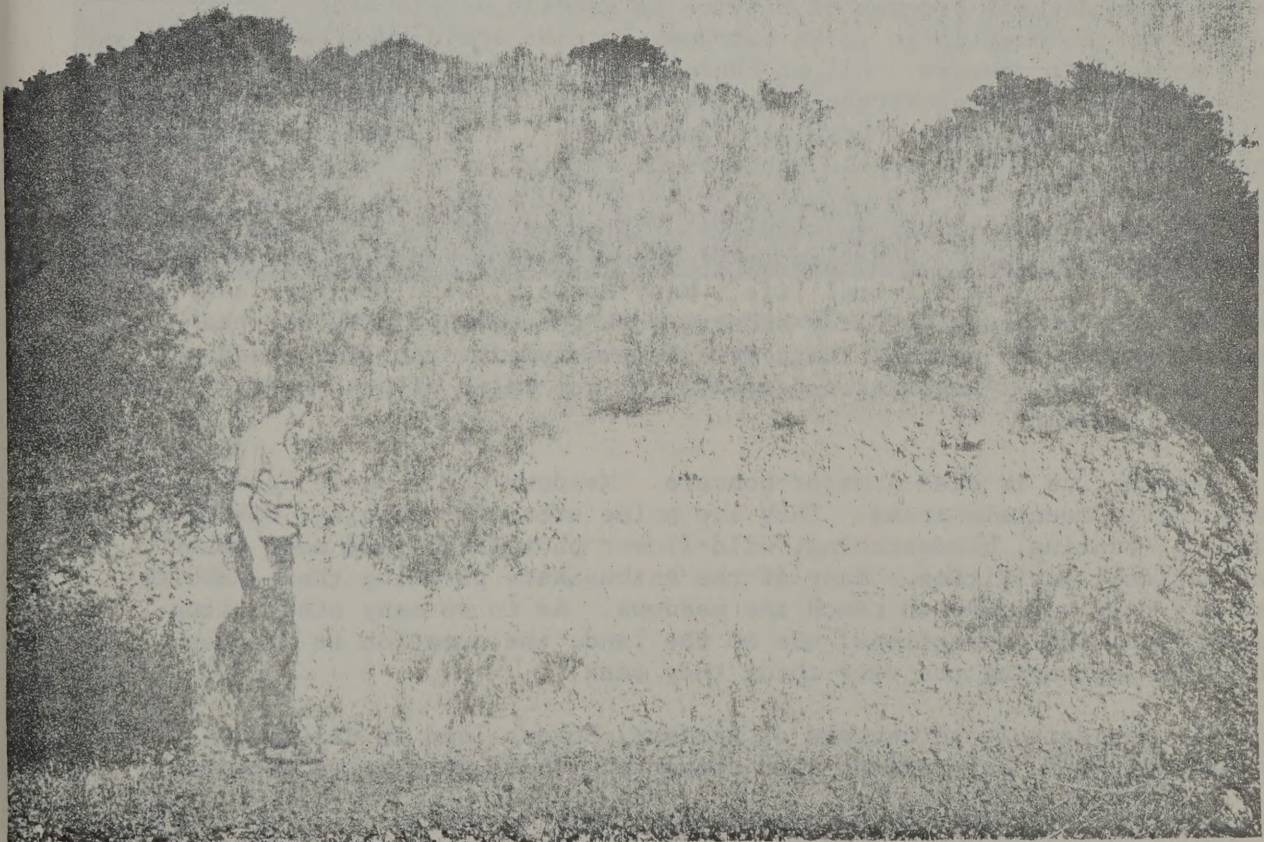


Fig. 22. A "tank-trap" closure of a firebreak, Trabuco District, Cleveland National Forest. These banks are created to deny vehicle access to the firebreaks. They discourage, but do not eliminate, vehicle use of the firebreaks. November 28, 1969.

b. Environmental Impact

The general ecological effects of off-road vehicle use are common to both BLM and Forest Service lands, but the specific problems depend on the type of vegetation involved. Forest and chaparral lands managed by the Forest Service will therefore be discussed here.

Actual wooded tracts within the National Forest are not the main problem areas, and none of the Forest Service personnel interviewed mentioned damage to timber as a matter of concern. Especially in the mountain lands of California, it is difficult to leave roads, and environmental effects tend to be confined to established trails. This minimizes, but does not eliminate, the vehicle problems.

In the case of the "mountain meadows," treeless areas found across a great range of elevations, there has been serious damage. Protective measures have been found necessary primarily in these areas. The meadows comprise a fairly small percentage of the total area of forest lands, but they are important to the ecology, economics and recreation use of the National Forests. Erosion is considered the most serious hazard associated with vehicle use (18). The soils of the meadows are generally fine-textured and alluvial. Many meadows are wet all or part of the year; in this condition they are highly susceptible to rutting (Fig. 23). Nearly all meadows contain running water for at least part of the year, and often trails will cross streams a number of times (18). After one rut is produced, there is a tendency for drivers to "fan-out" to avoid getting stuck. Streams are muddied, banks broken down, and in general the natural process of erosion is greatly accelerated. If damage were allowed to go to an extreme, streams could even be induced to change their courses. All of these effects reduce water quality and destroy protecting stream bank vegetation. In the higher and wetter meadows, vehicle tracks can disrupt the distribution of standing water and alter centuries-old patterns of vegetation.

Meadows are critical to wildlife. "Edge-effect," the meeting of two kinds of habitat, is a feature of the meadows which produces great diversity in plant and animal life. Many forms of wildlife live only in or near such meadows, and many others, such as deer and elk, use the areas for at least part of the year. Noise, fumes, startling speed and the destruction of vegetation detract from the value of meadows as wildlife habitat.

Aesthetics is also a major concern. Meadows are a major scenic resource in mountain areas. They are prime areas for camping, hiking, fishing, hunting, birdwatching, wild-flower photography and many other recreational activities. Many of the enthusiasts pursuing these hobbies use off-road vehicles to reach the meadows. As in so many other situations involving recreational use of the land, the question is whether they are destroying the very thing they seek.

A considerable percentage of National Forest land in California is not forested, but covered with chaparral, dense shrubby vegetation

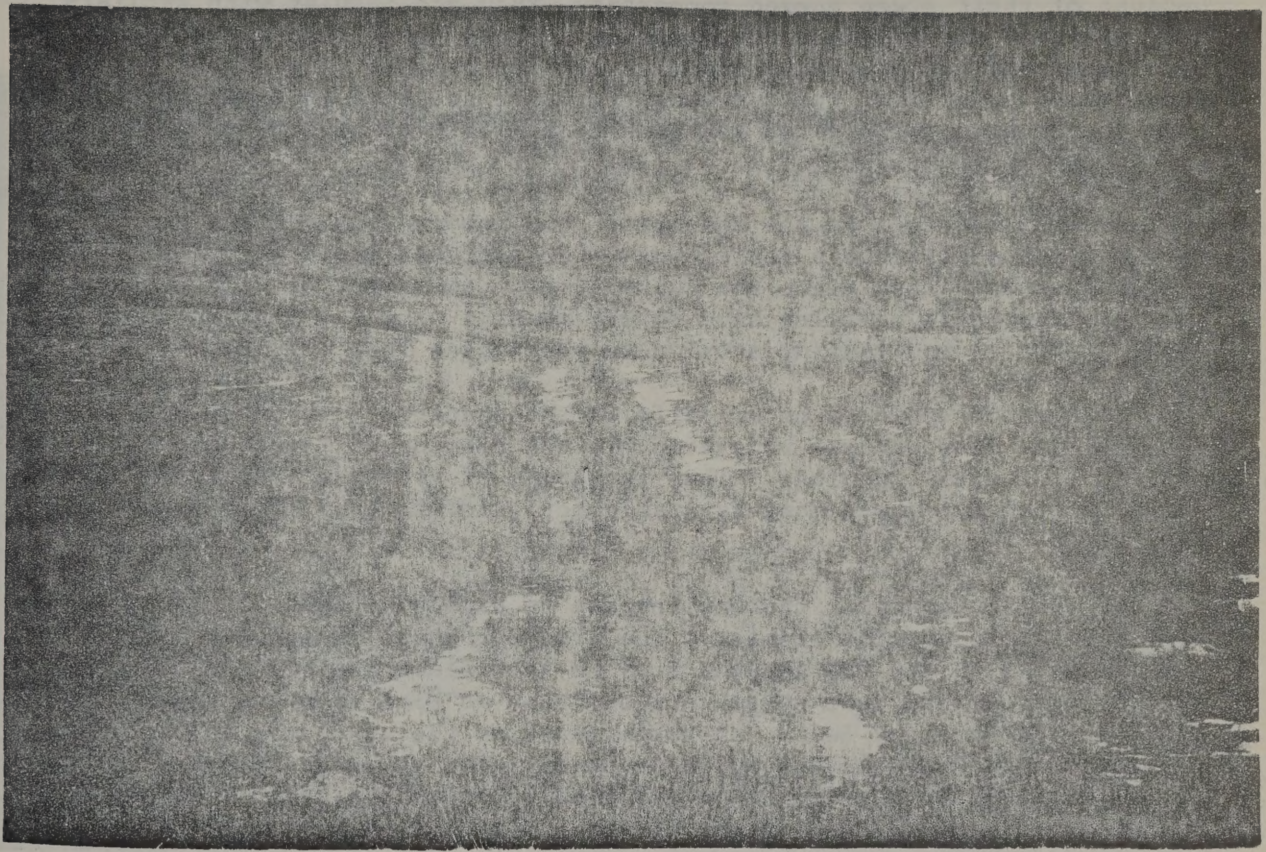


Fig. 23. A vehicle track across a grazed meadow. Snow collected in the tracks makes them stand out. Little Troy Meadow, Sequoia National Forest, November 28, 1969.

four to six feet high. Although chaparral has very little direct economic value, it serves to protect watersheds which are of great economic importance.

Dense chaparral is nearly impenetrable, even on foot, so that vehicle travel is limited to roads, trails, recent burns or firebreaks. The latter are 10-12 foot swaths bulldozed through the vegetation and along the mountain ridges to contain wildfires. These firebreaks are temporary and would quickly revegetate by sprouting (6). However, because of their steep rugged topography, they are popular with cyclists and continued use prevents revegetation. Paths other than firebreaks have been used for hill-climbing with similar results (Fig. 24). In an unvegetated condition, the decomposed granite soils of this region are notoriously prone to erosion and landslide. With erosion there will come a decrease in water quality.

Natural openings in the chaparral, such as the Los Pinos Potrero, also receive considerable vehicle use. The effects are similar to those in the Panoche Hills, since the annual grass vegetation is similar. In the last few years vehicles have roamed at will over the Potrero, creating many new trails and causing erosion in some cases (Fig. 21, 25).

Effects of vehicles on wildlife in the chaparral are difficult to assess. The dense brushy vegetation is not considered favorable for game habitat as are the openings. Thus the areas of greatest vehicle impact coincide with the areas most favorable for wildlife (and domestic animals) (20).

Aesthetic damage to the environment is easily apparent by visiting an area. Noise is a major problem. The irony in this situation is that people may leave the Los Angeles area to seek peace and quiet in a campground only to find that noise levels may be as high or higher than the city environment they left. Visual effects on the aesthetic resource are also apparent. Vehicle tracks in chaparral tend to stand out sharply; the light color of the soil contrasts sharply with the dark green or brown of the chaparral (Fig. 26).

The environmental impact of snowmobiles has not yet been severe enough to warrant closures. However, they serve as an illustration that new kinds of recreational vehicles can create entirely new patterns of use and create new kinds of problems. Thus far, the effects on soil and watersheds is almost non-existent. Reports of damage to young plantations have come from Wisconsin, Minnesota and Michigan (24, 25, 26). In Colorado, cutting of small trees for clearing paths and obtaining firewood has been noted (5). These same areas have reported game harassment and one instance of wanton killing of game (3). Other difficulties are the inevitable consequences of public use: littering, rescue operations and parking problems involving the transport vehicle (4). As with motorcycles, noise is a factor.

c. Problem Origins

Two major factors contributed to the present problems. First is the unprecedented increase in off-road vehicles. Second, the Forest Service

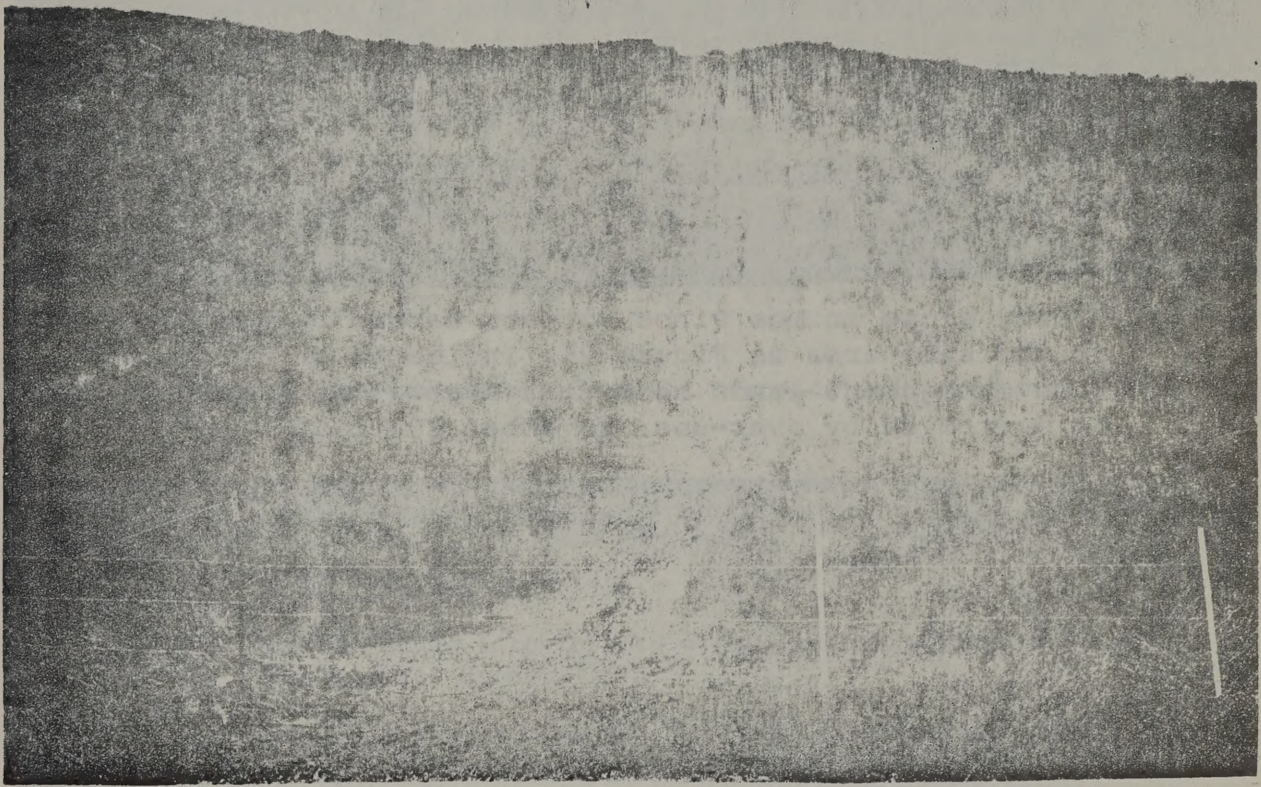


Fig. 24. A motorcycle hill-climb which follows an old pipe-line near El Cariso Campground, Cleveland National Forest. The fence in the foreground was erected about three weeks before this picture was taken. November 28, 1969.

Fig. 25. Grassy slope in Los Pinos Potrero marked by vehicle tracks in the same area as Figure 21. Incidents on Bureau of Land Management lands show that vegetation like this can be destroyed by over-use. November 28, 1969.

Fig. 26. Hillside above the El Cariso Campground, Cleveland National Forest. In the chaparral, trails are visible for great distances. Ruts in this trail were over a foot deep. November 28, 1969.

policy in California is that off-road vehicular use is legitimate, unless such use causes damage or presents a public hazard 4/. This attitude is consistent with the multiple-use concept being applied in all National Forests. However, the multiple-use concept also provides for regulation of incompatible activities. Many citizens feel that every off-road vehicle use is incompatible with most of the other uses of National Forests.

For the most part action has been taken after vehicle use has caused damage, rather than in anticipation of potential damage. Exceptions to this general rule are the Wilderness and Primitive areas and certain small areas of great scientific interest (e.g. Bristlecone Pine Botanical Area, Inyo National Forest, Condor Refuge, Los Padres National Forest) in which preventative measures have been taken (27).

d. Environmental Considerations and Alternatives

(1) Considerations

The policy of the California region with regard to vehicle use is the following:

"Restrictions on vehicular travel are made only on demonstration of need to:

(a) Prevent damage to watershed, timber or forage, or other National Forest resource.

(b) To promote public safety.

(c) Prevent undue interference with other authorized uses of the National Forest." (9)

This policy is stated broadly. Only by examining particular cases can one make any specific interpretation of the policy. The primary considerations made by Forest Service personnel when considering control seem to be erosion problems and conflict between vehicle users and other recreationists.

Assessment of vehicle damage is quite often necessarily subjective. At some point the Forest Service, usually at the District or National Forest level, decides that damage has become intolerable; corrective measures are suggested. It is likely that aesthetic and general ecological considerations play a role in the decision, but these have not been presented as important justifications. Many Forest Service personnel did, however, express concern for aesthetics and ecology. Because of the subjectivity of the procedure, interpretation of what constitutes "need"

4/ U. S. Forest Service Manual, Title 2300 -- Recreation Management "Chapter 2350 -- General Forest Environment Areas, (2351.21 -- Summer Cross Country Motor Vehicle Travel)" (1967).

and "damage" in the stated policy differ from one National Forest to another. One promising approach used in Missouri is to photograph points of heavy use periodically to follow the changes which occur (1).

(2) Alternatives

Assuming that complete exclusion of vehicles is an impractical solution to the problem (a statement not all would accept), the alternative would seem to involve identification of fragile areas and closure to vehicle travel before damage occurs. Enough is known already to make it obvious that some kinds of vegetation and soils are too fragile to withstand use. These areas could be closed or closely regulated. Other areas which are less fragile could be maintained open on the present "watchful waiting" policy. This kind of procedure is not unprecedented. Fire control closures are established to prevent damage, and there seems to be no reason why the same preventive approach could not be used in the case of vehicle use. Another alternative offered by Forest Service personnel (6, 8) is to concentrate the environmental impact in specific areas.

Vehicle operators are, of course, anxious to have as little regulation as possible. But Forest Service experience has shown that at least the organized users are willing to accept regulation if they can see the need. If the Forest Service were to launch a thorough study aimed at classification of land with regard to off-road vehicle use, and if it were accompanied by an educational effort, there is a good chance of winning over most responsible vehicle users.

The Forest Service recognizes the need for public education. Increased efforts in this area will require funds. Adequate enforcement of the existing laws is impossible under present employment restrictions. Unless citizens can be convinced that the Forest Service is serious about regulating vehicle travel, few results can be expected.

III. SUMMARY

The above report is concerned with the off-road vehicle impact in California. Similar problems exist elsewhere in the nation. The alpine tundra of the Rocky Mountains, the flat open pine woodlands of the Coastal Plain, the Ozark mountains of Missouri are all susceptible to increasing off-road travel under the present procedures of regulation practiced by the Bureau of Land Management and the Forest Service. The examples of the Panoche Hills, Redrock Canyon, mountain meadows and chaparral are test cases which prove that unregulated use threatens the environment.

Looking to the future, the arrival of the snowmobile illustrates that fewer and fewer wildlands are remote and inaccessible, and that heavy vehicle use will occur year-round. Other inventions will surely follow. With the present increase in population and greater pressures on outdoor recreation areas, one can readily predict that conflicts of the type discussed here will increase.

LITERATURE CITED

1. Aley, Tom, Hydrologist, Mark Twain National Forest, Springfield, Missouri, Personal Communication, January 2, 1970 .

2. Bright, William, Area Manager, Bureau of Land Management, Bakersfield District. Personal Communication, December 6, 1969.

3. Buchanan, Dean, Recreation Staff Officer, Superior National Forest, Duluth, Minnesota, Letter, December 5, 1969.

4. Carroll, Art, Recreation Officer, Mammoth Ranger District, Inyo National Forest, Mammoth Lake, California, Personal Communication, December 1, 1969.

5. Feuchter, Roy, Assistant Division Chief, Division of Recreation and Land, Rocky Mountain Forest Region, Denver, Colorado, Personal Communication, December 18, 1969.

6. Fitch, Charles, Resource Assistant, Trabuco District, Cleveland National Forest, Santa Ana, California, Personal Communication, November 28, 1969.

7. Flynn, Joseph V., Chief, Division of Lands, U. S. Forest Service, San Francisco, California, Personal Communication, December 29, 1969.

8. Grigery, Thomas E., District Ranger, Cleveland National Forest, Descanso, California, Personal Communication, December 8, 1969.

9. Iverson, Wayne D., Acting Chief, Division of Recreation, California Region, U. S. Forest Service, Letter, November 28, 1969.

10. Lessel, Ralph L., Resource Officer, Tahoe National Forest, Nevada City, California, Letter, December 10, 1969.

11. Lorang, Phyllis E., Secretary-Treasurer, San Diego County Cattlemen's Association, Letter, September 10, 1969.

12. McArdle, John P., Deputy Forest Supervisor, Huron-Manistee National Forest, Cadillac, Michigan, Letter, December 17, 1969.

13. Penny, J. R., California State Director, Bureau of Land Management, Personal Communication, December 30, 1969.

14. Penny, J. R., Memorandum to Director, Temporary Closure of Panoche Co-operative Land and Wildlife Management Area, April 18 to July 7, of the Bureau of Land Management (C4-D, 6251), April 11, 1969, p. 5.

15. Saarni, Roy, Recreation and Land Use Officer, Cleveland National Forest, San Diego, California, Personal Communication, November 25, 1969.

16. Shreve, Forrest, Vegetation of the Sonoran Desert, (Vegetation and Flora of the Sonoran Desert, Vol. I), Washington, D.C., Carnegie Institution of Washington Publication 591 (1951).

17. Slattery, Leo, Forester, Division of Lands, California Region, U. S. Forest Service, Personal Communication, December 29, 1969.

18. Smith, Glenn S., District Ranger, Sequoia National Forest, Kernville, California, Personal Communication, December 7, 1969

19. Svensen, H. A., Assistant Regional Forester, Eastern Region, Milwaukee, Wisconsin, Letter October 2, 1968.

20. Taber, Richard D., and Dasmann, Raymond F., The Dynamics of Three Natural Populations of the Deer Odocoileus hemionus columbianus, Ecology, XXXVIII (1957), pp. 233-246.

21. The California Desert Challenge, Proceedings of the Annual Meeting of the California State Advisory Board to the BLM, March 6-7, 1969, p. 125

22. U. S. Bureau of Land Management, California State Office, A Report with Recommendations Arising from a Study Concerning Off-Road Vehicular Use on BLM Lands in California, 1968, p. 33.

23. U. S. Bureau of Land Management, California State Office, and National Park Service, Western Regional Office, The California Desert, (A Recreation Study of the Desert Public Domain Lands of California under the Jurisdiction of the Bureau of Land Management, 1968.

24. U. S. Bureau of Land Management, Folsom District, Panoche Off-Road Use Area Progress Report (April 18-July 7, 1969).

25. U. S. Bureau of Land Management, Folsom District, Vehicular Use in Panoche Hills, Western Fresno County, California, April 22, 1968. p. 71.

26. U. S. Forest Service, Los Pinos Potrero Recreation Area, Recreation Management Plan, Cleveland National Forest, July 11, 1964, prepared by Roy W. Saarni. P. 25.

27. U. S. Forest Service, National Forest Areas Where Motor Vehicle Use is Limited. June, 1969.

28. Vail, Delmar D., District Manager, Bureau of Land Management, Folsom District Office, Personal Communication, December 30, 1969.

29. Watkins, T. H., Infernal Machines on the Public Lands, Cry California. Spring, 1969, pp. 6-19.

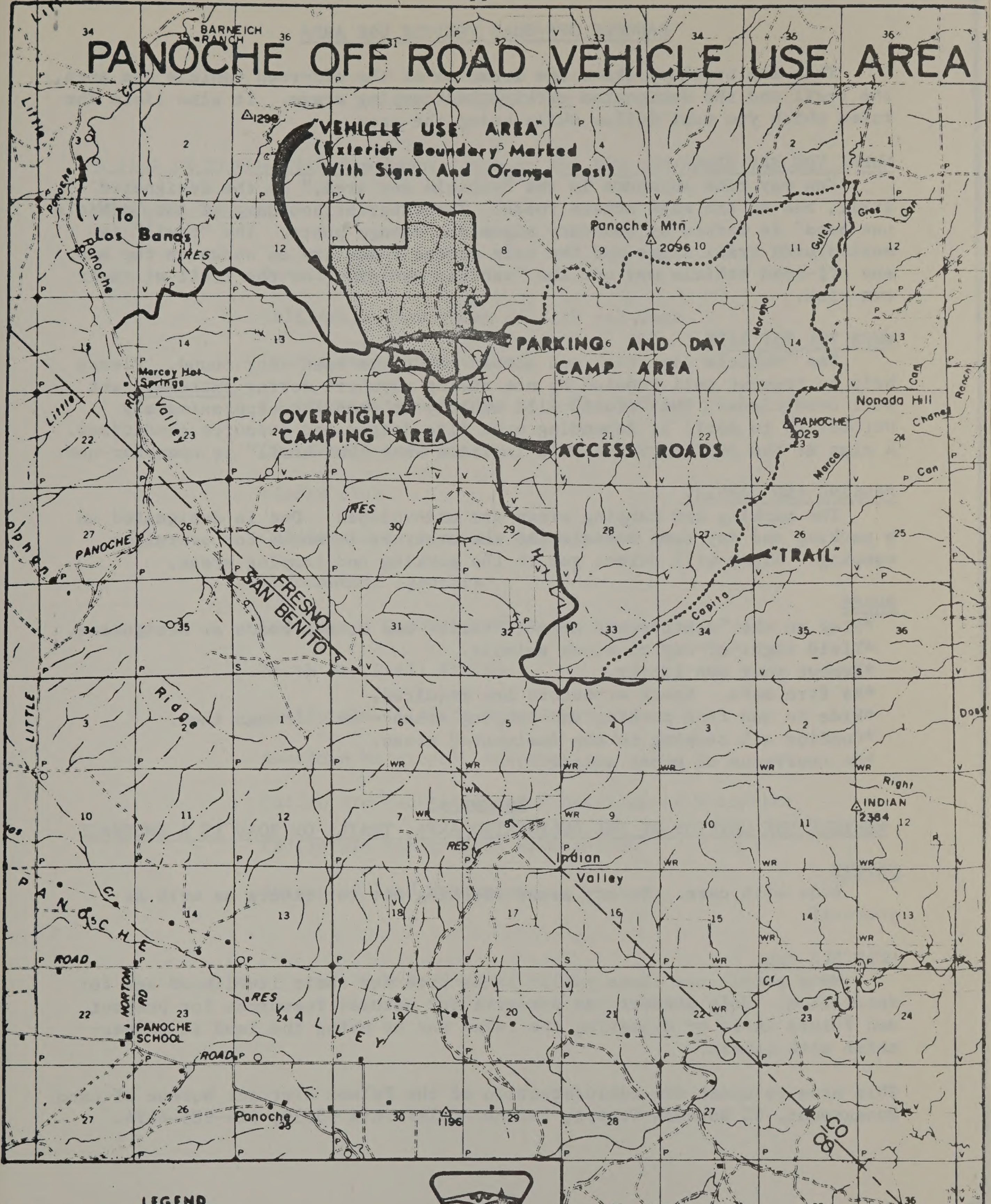
Additional References

U. S. Bureau of Land Management, The Motorcycle and Public Land in California (A Report on the Demands and Impacts of Cross-Country Sport Motorcycling on the Public Domain Lands in California, 1968.

Ruch, James B., Assistant to the California State Director, Bureau of Land Management.

Tocher, Craig, State Recreation Specialist, Bureau of Land Management.

APPENDIX I



LEGEND

P - PATENTED LANDS

V - PUBLIC DOMAIN LANDS

WR - WITHDRAWN PUBLIC DOMAIN LANDS

Circle shows approximate area of aerial photos.

DOI SMAMA NOV 69, 2M

PANOCHE OFF-ROAD VEHICLE USE AREA

This map brochure shows the location of the off-road vehicle use area, the trail and the designated parking and camping areas. It also lists the rules which you must follow while using the area.

WHERE YOU MAY RIDE

You may ride anywhere in the "vehicle use area," on the designated trail, and on the main access roads. The exterior boundary of the "vehicle use area" is marked by boundary signs and orange posts. The "trail" is marked with trail signs and the main access roads are as shown on the map. Any off-road vehicle may use the "vehicle use area" or the trail at their own risk.

WHEN YOU MAY RIDE

The "vehicle use area" and access roads are open year round. Please help to prevent soil erosion by not riding anywhere during extremely wet soil conditions. The "trail" will usually be open from approximately October 15 to April 1, depending upon fire danger and resource conditions. A sign at the road entrance will indicate when the "trail" is open for use.

PARKING AND CAMPING

The parking and camping areas are undeveloped. One is designated as a parking and day camp area, while the other is intended for overnight camping. Signs will direct you to the parking and camping areas.

RULES

*Stay on the "vehicle use area", "trail" and access roads as designated.
*Yield right-of-way to stock animals.
*Remove your own litter.
*Be fire safe. Spark arrestors are required.
*Ride to and from parking and camping areas - not through them.
*Confine all camping to the designated areas.
*Be courteous of other users.

REMEMBER!
VEHICLE USE OUTSIDE OF THE DESIGNATED AREA, TRAIL, OR ROAD IS A TRESPASS

SAFETY

Ride with care. Safety means watching out for others as well as yourself.

MULTIPLE USE

Many people use these public lands both for their livelihood and for recreation. Help protect and preserve our natural resources for present and future users by observing the rules and by using the land in cooperation with others.

This area is under the administration of the Folsom District Bureau of Land Management, 63 Natomas Street, Folsom, California 95630, 916-985-4474.

APPENDIX II

A List of Groups with Representatives on the BLM Off-Road Vehicle Advisory Council

- Dune Buggy Group
- California Department of Fish and Game
- Desert Protective Council
- California Association of 4-Wheel Drive Clubs
- California Farm Bureau
- Sierra Club
- California Cattleman's Association
- Enforcement Agencies
- California Outdoor Recreation League
- North Bay Trail Riders
- California Wildlife Federation
- American Motorcycle Association
- California Federation of Mineralogical Societies
- California Woolgrowers Association
- Bureau of Land Management

CASE STUDY NO. XVII

TRANSMISSION LINE COMPOSITE

by

THEODORE OSMUNDSON, FASLA
Landscape Architect
706 Sansome Street
San Francisco, California 94111

Prepared Under a Contract With The
Rocky Mountain Center on Environment
Denver, Colorado

CHAPTER I

STATEMENT AND VERIFICATION OF THE PROBLEM

In the absence of strong public concern for the natural environment, until recently, and dominated by the historical need to bring electric power to various undeveloped areas of the United States as economically and as reliably as possible, certain practices in installation and maintenance of transmission lines have been standardized by the public power industry. In many cases these have proven to be contrary to the best aesthetic treatment of the landscape they traverse. The picture of huge silvery transmission towers marching across mountain, forest and plain in a wide straight swath without regard to contour, vegetation, natural landscape features, or, indeed, of other manmade installations, is a common one to all travelers throughout the country. In an expanding industrial nation, this adverse impact on the natural scenery has been tolerated as a necessary evil. Until recent years, beginning with the White House Conference on Natural Beauty held in May of 1965, no concerted effort had been made either by government, the public, or by the industry to recognize the problem or to suggest or implement solutions. In the past five years, the problem has come into sharp focus, and some important steps have been taken to solve the problem of transmission line impact.

Two factors have emphasized the importance of the problem. First, electric power demand doubles every ten years and studies of the Federal Power Commission predict an increase of 44,815 miles of high voltage transmission lines by 1975. Secondly, public criticism of environmental disturbances caused by electric power facilities has mounted rapidly in recent years. In a survey of 2,018 utilities throughout the United States, the "Electric Utilities Industry Task Force on Environment" found that "the portion of customer-weighted response indicating considerable concern over the appearance of distribution lines is expected to increase fifty-fold over the ten-year period between 1962 and 1972." They also found that "overhead transmission lines receive more overall criticism than any other portion of facilities." Predictions of greater public concern for the environment both from the standpoint of aesthetics and from the standpoint of public health have proven correct. The quality of the environment has today become a major social, economic and political issue.

In stating the problem, it is important that the view of the industry be cited. In 1968, the Committee on Environment of the Edison Electric Institute sponsored a Conference on "Energy, Economics and the Environment." The Preface to the Conference Proceedings states that "it is obvious that the physical facilities of electric utility companies, as well as the service they supply, has an effect on the environmental quality of the nation." The "Electric Utilities Industry Task Force on Environment" in its report of July, 1968, states that "high voltage lines and the towers necessary to support them are a visual obstruction, and elimination of them, if it were possible, would contribute to the environment."

Although the industry, along with the public, recognizes the problem, the words, "if it were possible," have great significance in finding a solution. The most obvious solution of the visual impact of transmission lines, that of undergrounding, has so far been rejected. The Working Committee of the President's Council on Recreation and Natural Beauty states that it is "not technologically or economically feasible to place high voltage electric transmission lines underground for long distances." Indeed, the Federal Power Commission's Advisory Committee on Underground Transmission [1] reported in 1966 that in rural areas the cost difference averages 14 to 26 times greater than overhead installations. In places it may go to 40 times, due to special situations. Also, current methods of undergrounding make repairs to cable failures difficult to locate and costly and time consuming to repair.

Obviously, transmission lines across public lands such as mountainous forests and rocky areas of the West, where most of the public lands are located, would be the most difficult to install and maintain. In addition, the clearing, trenching, and maintenance access necessary to operate undergrounded lines in such areas would also scar the landscape with straight, arbitrary, clear-cut swaths and result in scenic impact almost as detrimental as overhead installations in the open landscape of mountains and forests. We must conclude, while recognizing that what is or is not "attractive" may vary from person to person, that transmission lines are visually unattractive to the great majority of Americans. It is also obvious that, with certain handicaps of current technology, means other than undergrounding must be found to reduce the adverse impact of such facilities on the scenic quality of the public lands.

This case study will highlight examples of transmission line impact that has been dealt with by public land agencies and power companies. Each example represents positive methods of greatly reducing this impact that have been found and implemented. These techniques have resulted in dramatically reducing the impact without undergrounding, with relatively low extra installation cost and without sacrifice of vital reliability. This report will deal with three specific examples. Time limitations made investigation of a fourth impossible. In each case, the impact was on National Forest lands, and in one instance overlapped onto lands of the Bureau of Land Management and a national historic site.

These sites, agencies, and private companies involved are as follows:

1. The Henderson 115 KV Line of the Public Service Company of Colorado in the Arapaho National Forest, Colorado.

2. The Swan Valley-Teton 115 KV Line of the Bonneville Power Administration in the Teton and Targhee National Forests Wyoming.

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[1] Federal Power Commission's Advisory Committee on Underground Transmission, "Underground Power Transmission." A Report to the Federal Power Commission, April 1966.

3. The Belden-Rock Creek 230 KV Line of the Pacific Gas and Electric Company in the Plumas National Forest, California.

4. The Transmission Line of the Bonneville Power Administration in the Wallaw-Whitman National Forest, Oregon and Washington. (Not covered in this report).

Each of the first three projects have a number of factors in common and also certain unique factors.

All three projects were (a) initiated by a utility company applying to a government agency for a permit to build a transmission line across public land; (b) built primarily on U.S. Forest Service land; (c) modified from the original proposal as a result of multiple-use impact studies made by the Forest Service; (d) directly affected by the Multiple Use-Sustained Yield Act of June 12, 1960; (e) initiated by Forest Service desire to mitigate environmental impact;(f) situated in scenic mountainous terrain near highways carrying major tourist traffic; (g) successful in lessening the visual impact of transmission lines; and (h) successful largely because of the excellent cooperation and working relationships between Forest Service personnel and the utility companies.

Similarities in techniques were: highly selective and sensitive routing; selective cutting in the right-of-way; painting of steel or aluminum towers and staining of wooden poles; use of non-specular conductors; non-reflective hardware; use of helicopters to deliver and install towers and conductors to avoid disturbance to the soil and plant growth; reseeding construction roads and other disturbed soil surfaces; and the use of horses (in the Henderson and Teton projects) to remove slash down to the edge of the highway where it could be taken as firewood by the public.

CHAPTER II

THREE CASE STUDY NARRATIVES

a. Case Study #1 - "The Henderson Line"

115 KV Transmission Line
Georgetown Substation to Climax-Henderson Project

Public Service Company of Colorado
in cooperation with
The Forest Supervisor, Arapaho National Forest
U.S. Forest Service, Golden, Colorado

In May, 1966, American Metals Climax Company, the world's largest producer of molybdenum, contacted Public Service Company of Colorado about power to serve the development of a new ore body. Known as the Henderson Project, the site of the operation is surrounded by Forest Service lands. It was estimated that the mine would produce an estimated 1.8 billion pounds of molybdenum in its life at the rate of 50 million pounds annually. According to engineering estimates, such an operation would require a substantial electric load served by a 115,000-volt transmission system.

It was obvious at the outset that special consideration would have to be given to the right-of-way location and transmission line design and structure in order to meet Forest Service requirements and anticipated citizen complaints. The utility company and the Forest Service had worked closely in such matters before this time and were well aware of each other's objectives and problems.

The new molybdenum mining operation near Jones Pass required construction of a 115,000-volt line from Georgetown, Colorado, to the mine site. The total length of the line is 13.0 miles, 8.5 miles of which are through the "travel influence zone" of Arapaho National Forest in Clear Creek County. Other parts of the line are across private lands and those under jurisdiction of the Bureau of Land Management. In agreement with the U.S. Forest Service, the line follows a course north from Georgetown to a point just south of Empire, then west along the course of the west fork of Clear Creek to the mine site. This route involves a gradual climb from 8,512 feet at Georgetown to 10,400 feet at the mine. On either side of the right-of-way are peaks in excess of 12,000 feet; these are pocked with about 50 old and new mineral diggings.

In following the west fork of Clear Creek, the line parallels U.S. Highway 40. Because this "paralleling" is contrary to the multiple use concept of the Forest Service, which discourages power lines in what is called a "travel influence zone," alternatives had to be considered.

Because of the topography of the land, it was recognized by the Forest Service that an alternate route was out of the question. The only feasible route for the line was along the highway. The only workable alternative, therefore, was to make the line as "invisible" as possible.

To accomplish this, personnel of the Company and the Forest Service worked out conditions for construction. A private organization, the Rocky Mountain Center on Environment, also was consulted. These conditions were adhered to not only across the national forest lands, but in the other areas as well.

1. Wooden-pole, H-frames were used instead of metal towers, and the wood of poles and crossarms was stained a mottled green and brown to provide a camouflage effect.

2. Conductors (wires) on the line were of a non-specular type. In the manufacturing process, the usually shiny aluminum was dulled to prevent sun glare.

3. In some instances, hardware used to support the lines on the poles was painted during the construction period in order to achieve the same non-specular quality.

4. Right-of-way was given special consideration. The Public Service Company of Colorado forester and the landscape architect for Arapaho National Forest walked the route and made recommendations according to the conditions of each area: The right-of-way boundary would be erratic, that is, the usual "straight slot" would be eliminated by irregularly varying the width of cleared right-of-way through timbered areas; minimum width was 30 feet, with the maximum 75 feet; natural openings through the trees were blended into the right-of-way; trees less than 10 feet high in the right-of-way were topped back to eight feet so as to stimulate spreading growth rather than vertical growth; large trees too tall for safety reasons were felled, even if they were more than 75 feet from the line.

5. All timber and slash cut for the right-of-way was removed completely in order to eliminate any possibility of a bark beetle infestation. What could not be scattered was hauled out to the road. This job was done by men and horses rather than by machines so as not to chop up the ground or require access roads to be built.

6. Helicopters were used for construction of the line and for the transportation of men and materials. Again, this was to avoid construction of roads into the right-of-way.

7. In conjunction with point six, heliports and storage depots were maintained away from the construction area -- again to do away with any possible damage to forest lands.

A special problem confronted the Company with respect to the construction of this line as it related to construction through the town of Georgetown itself. Various alternatives were considered and after several meetings with town officials special single pole structures were proposed. Subsequently, it was learned that the Georgetown Loop Mining District is included in the National Register of Historic Sites under the National Historic Preservation Act (Public Law 89-665). Section 106 of this Act provides in its pertinent part the following:

> . . . the head of any Federal Department . . . having authority to license any undertaking shall . . . prior to the issuance of any license . . . take into account the effect of the undertaking on any district, site . . . that is included in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under title II of this Act a reasonable opportunity to comment with regard to such undertaking.

In spite of the action taken by the town officials of the town of Georgetown, the State Historical Society of Colorado objected to the proposed construction by the Company of the Georgetown line on the grounds that such line would have an adverse effect upon the Georgetown Historic

District. As a consequence, the local Denver Office of the Bureau of Land Management, being uncertain as to the effect of Section 106 of the National Historic Preservation Act, hesitated to grant the Company a permit for that portion of the line outside of the town of Georgetown on BLM land until the objections of the State Historical Society were satisfied.

This matter was finally resolved in September, 1968, by the appointment of a Special Committee under the National Historic Preservation Act and the concurrence of that committee with certain modifications made by the Company to the proposed construction of the line in the town. These modifications were that the number of poles for the transmission line in the town would not exceed six in number, that the height of the poles would be reduced, and that the Company would make other modifications in connection with its 2,300 volt distribution system within the town to substantially reduce the number of poles.

Actual construction of the line began the last week of August, 1968. Prior to that, of course, a great deal of engineering had already been completed. Clearing the right-of-way started in July. On November 22, 1968, the new line was energized, providing an essential service to an essential industry while maintaining the natural integrity of the national forest lands.

In 1964, Public Service Company of Colorado undertook construction of the Cabin Creek Pumped Storage Hydroelectric Project, located about three miles south of Georgetown, in Clear Creek County, Colorado. Cabin Creek has an installed generating capacity in excess of 300 megawatts. It is the highest altitude pumped storage electric generating plant in the world, and is the largest hydroelectric generating plant in the State of Colorado.

The Cabin Creek Project was built pursuant to a license granted to the Company by the Federal Power Commission, dated March 23, 1964. The Project included the construction of some 31 miles of double circuit 230 Kv transmission line from the Cabin Creek site to the Lookout Substation of the Company in Golden, Colorado, near Denver. Route of this high voltage transmission line passes through well-traveled, but highly picturesque mountain country adjacent to the Denver metropolitan area.

Various alternative routes for construction of the transmission line between Georgetown and Denver were considered. Any route had to cross public domain and private land. After consultation with the Forest Service and Bureau of Land Management, it was recognized that the most feasible route was utilizing existing right-of-way which the Company already used for the old Shoshone Line from Western Colorado to Denver. This 115 Kv line, built in 1910 under permits from the Forest Service and Bureau of Land Management, passed close to the Cabin Creek Project and the right-of-way for this existing line could be used for the new 230 Kv line by razing that section of the old line from the Georgetown area to the Lookout Substation, in Golden. The older line was a single circuit 115-Kv, while the Cabin Creek Project required two 230,000 volt circuits -- eight times the amount of power that was carried on the old line.

Construction of the new 230 Kv double circuit transmission line from Cabin Creek to the Denver area was accomplished in several stages. First, a special tower (Fig. 1) was designed to carry the new circuits utilizing a vertical configuration for each circuit that would keep the lines within the older 100 foot right-of-way. This eliminated the need for widening the old right-of-way. Second, towers were built of aluminum which made them light enough to use helicopters to carry towers to each site (Figs. 19, 22) and obviate the need to build access roads for heavy vehicular equipment. Helicopters also were used to remove the old line towers from the right-of-way, as well as to deliver concrete (Fig. 20) and other material for construction of foundations for the new towers. In all cases, existing roads were used, but not widened. No new roads were built.

This line represented the first use by the Company of helicopters for the construction of a high voltage electric transmission line. Special engineering problems were involved in the use of a helicopter for this purpose at altitudes which ranged from 6,000 feet at Lookout Substation to 11,000 feet at Cabin Creek. As nearly as possible, the line was designed so that each new tower was located on an old tower site.

Construction of this line was completed in December, 1966, when both circuits were energized and placed in service shortly thereafter.

Subsequent to completion, the Company experienced some public reaction to the appearance of the line. Unanticipated by the Company was the highly reflective quality (Figs. 1, 2, 5) of the aluminum towers in the bright sunlight. Consequently, in spite of precautions taken by the Company with respect to the right-of-way, the new towers and line were much more clearly visible to the traveling public in the area than would have been the case had the Company used heavier, but conventional, galvanized steel towers. It would not have been possible for the Company to construct this line with the use of helicopters if the towers were constructed of steel rather than aluminum.

Currently, the Company has undertaken an experimental program to paint all or parts of the aluminum towers most clearly visible from the highway. For this purpose, the Company is using a special acid base and metal primer applied by brush or spraying. Use of the paint has assisted to some extent in camouflaging appearance of the towers (Figs. 10, 11).

A comparison in visual impact of the "Henderson Line" and the "Cabin Creek Line" is striking, despite the major efforts by the Public Service Company to reduce environmental impact in both cases. The "Henderson Line" does blend with the landscape to an amazing degree. In only a few sites does it stand out in the landscape clearly. The "Cabin Creek Line" however, is plainly visible and is conspicuous in the landscape from several miles away in some sites. These differences of appearance are mainly due to the shiny aluminum towers, the straight swath cut through the forest, and the routing of the line over ridges and valleys in the most direct manner. The visual impact of the "Cabin Creek Line" is somewhat lessened by the continuous ground cover that was maintained by helicopter placement of the towers, so that added roads would not be necessary. Its impact is also reduced by the fact that other portions of the landscape were spared by the use of an existing right-of-way for this line.

b. Case Study #2 - "The Swan Valley-Teton Line"

115 KV Transmission Line
Swan Valley to Jackson Hole

Bonneville Power Administration
in cooperation with
The Forest Supervisor, Teton National Forest
U.S. Forest Service, Jackson, Wyoming

The Jackson, Wyoming area prior to construction of this line had a 69 KV line between Alpine, Wyoming, and Jackson. The capacity of this line was calculated to be 5,680 KW. The peak load in 1966 was 8,500 KW. Although temporary compensation for exceeding this capacity has been used, loads have increased rapidly in recent years and are expected to continue to increase as the recreation potential of the area develops. Therefore, the local power company, Lower Valley Power and Light, Inc., contracted with the Bonneville Power Administration for additional power to be supplied over a new 115 KV transmission line. Since this power would originate at a generating plant east of the Tetons and have to be brought into Jackson Hole over the mountains by overhead lines, the impact of this line on the scenic quality of the magnificent landscape of the Tetons was of great importance.

In accordance with the Multiple Use Concept of the Forest Service, the route proposed by the power company was considered in an impact study of the line. The initially proposed route was rejected for its potentially adverse impact on the scenery of the area. The route would have traversed the Snake River Canyon with exposure to public view from the highway for several miles in this scenic canyon. Existing power line right-of-way would have had to be increased from 100 feet to 300 feet. Three other routes were investigated and discarded because of inaccessibility during the winter months. Although the line was due to be completed in the fall of 1967, the unavoidably long time necessary to select the most satisfactory route delayed completion until November, 1968.

Two contracts were issued, one for clearing the right-of-way and construction of access roads, and one for erecting line structures and stringing conductors. The clearing contractor began work in August, 1967, and was expected to complete his work in August, 1968. However, because the "Committee to Save the Tetons" objected to the routing of the line and the access roads in the Lower Phillips Ridge area, where the line entered Jackson Hole, the contractor was asked to delay his work.

Two routes had been considered to enter Jackson Hole from the Teton Pass to make connection to the distribution lines. The first, into the

Mosquito Creek drainage, would have required the new line to proceed for several miles across the valley floor before connecting to the distribution system. The second, and the one proposed, traversed the backside of Phillips Ridge adjacent to the Valley before coming down off the ridge about half way between Jackson and Teton Village Ski Resort. Bonneville and the Forest Service studied both routes carefully in the framework of the multiple-use concept and chose the Phillips Ridge route for the following reasons:

(a) Locating the line for the most part on the backside of Phillips Ridge would effectively conceal the line from the view of most people on the valley floor and on the new Teton Pass road, and consequently would have less scenic impact.

(b) The line could more easily be connected with existing transmission facilities in the Jackson Hole Valley than the first route.

(c) The Teton substation in which the transmission line would terminate could be concealed in a grove of trees.

(d) Other factors such as snow and rockslide probabilities, amount of clearing and access also favored the Phillips Ridge route.

The route was agreed upon by Bonneville Power Administration, the Forest Service and Lower Valley Power and Light Inc., the local distribution company. The clearing contractor began work in August, 1967.

In early September, 1967, the "Committee to Save the Tetons" met to discuss the line routing. Bonneville representatives attended and declared their willingness to study suggested alternatives. Six alternatives were suggested for Phillips Ridge. The utility company and the Forest Service rejected all for one or more of the following reasons: additional clearing; greater visibility of the line from Teton Village and the airport; higher cost of access roads; avalanche danger; rockslide hazard; more difficult winter maintenance; the line structure would have to parallel a road for 3/10 of a mile, detracting from the scenery; and more private property would have to be crossed.

Both Bonneville and the Forest Service were concerned about the impact on the magnificent scenery of the area. Cooperation between the two groups was excellent throughout. Agreements were signed to control the techniques to be used in blending the lines into the landscape, and the Forest Service assigned a full-time man to work along with the contractor's crews to oversee the agreements. The following are some of the practices followed in addition to those listed above for all three Case Studies.

(a) Selective clearing in which only the trees representing a danger to the line were removed. Some trees up to 130 feet in height located in low areas remain standing, spanned by the line.

(b) The direction of the Teton line was changed frequently at strategic points to prevent the appearance of long straight cuts.

(c) Access roads were narrowed by elimination of ditches.

(d) All crawler-type machines were equipped with extra-wide pads and limited to slope areas of 35% or less to limit soil damage and erosion.

(e) Metal structures and conductors are of dull finish to reduce reflection.

(f) Light brown wood poles were used to blend with natural background.

(g) Access roads were eliminated in some areas.

(h) In designated "scenic areas" only trees and material endangering the line or seriously hampering construction were removed.

The line was completed in the fall of 1968.

c. Case Study #3 - "The Belden - Rock Creek Line"

230 KV Transmission Line
Belden Generator to Rock Creek

The Pacific Gas and Electric Co.
in cooperation with
The Forest Supervisor, Plumas National Forest
U.S. Forest Service, Quincy, California

A special use application was submitted to the Forest Service in September, 1966, for permission to survey a proposed 230 KV transmission line approximately 10 miles long between Belden and Rock Creek in the Feather River Canyon. Almost all of the line crossed over land under the Forest Service jurisdiction of Plumas National Forest.

The addition to Pacific Gas and Electric Company's transmission system was deemed necessary in order to provide the flexibility and reliability of operation needed for the Company's entire Feather River hydroelectric system.

Completion of the line was scheduled to coincide with completion of the new Belden Power House in August, 1969.

The combined output of the Butt Valley, Caribou No. 1, Caribou No. 2 and Belden power plants is 352,000 kilowatts. In the event of an outage of either of the then existing Butt Valley-Table Mountain 230 KV or Caribou-Butt 115 KV lines, the one line remaining in service could not carry the combined output: approximately 250,000 KW with the 230 KV line out, and 100,000 KW with the 115 KV line out.

In addition, to avoid waste of the water-power resource, it would be necessary to reduce the water releases from Lake Almanor via Butt Valley Reservoir to the amount necessary to generate only the power that could be carried by the line remaining in service. This reduction in water releases would require further reductions in the power that could be generated at three of the four downstream plants, i.e. Rock Creek, Cresta and Poe. These have a combined generating capacity of 300,000 KW. Therefore, a reduction in water release from Lake Almanor would affect the operation of approximately 650,000 KW of generating capacity.

In March, 1967, the Company was informed that the Division of Recreation in the Regional Forester's office requested that alternative routes be investigated for the proposed line. The Division of Recreation proposed a route out of sight from the Feather River Highway. Possible alternate routes were investigated in cooperation with representatives of the Company, the Regional Forester's office and Plumas National Forest.

The Forest Service evaluated all aspects of the alternative routes, including the visual-aesthetic impact of the transmission line. They also weighed the impact of a less visible location and additional access road construction against a more visible location and considerably less access road construction. This was an important factor due to the highly erodible decomposed granite soil in the Feather River Canyon.

The route favored by the Forest Service was a compromise based on their evaluation of the impact on scenic and watershed values. In October, 1967, this route was selected for the final location.

It was also agreed that the Company would design and construct the line to minimize the visual-aesthetic impact of the line. The following measures were taken:

(a) Individual towers were located to be as unobtrusive as possible.

(b) Selected towers were designated to be painted a color to blend with the environment (46 towers of the total of 75 towers were painted).

(c) Non-specular conductors were used to reduce visibility.

(d) A clearing plan and a landscape and erosion control plan were developed to minimize the cutting of vegetation.

(e) All access roads were built on temporary roads and "put-to-bed" after construction of the line was completed.

(f) Helicopter construction methods were used where feasible to minimize clearing of vegetation and road construction.

The Forest Service Special Use Permit granting permission to construct, operate and maintain the Belden-Roc, Creek 230 KV transmission line was fully executed in July, 1968. Construction commenced in August, 1968, and the line was put into operation in August, 1969.

An application, now pending, was submitted to the Forest Service in April, 1969 to convert the Use Permit to a fifty-year easement.

The objective of minimizing the scenic-aesthetic impact of this line was achieved by resolving mutual problems through cooperation between the Forest Service and the Pacific Gas and Electric Company.

Commentary on the Case Studies

The methods and guidelines used in each of these three projects are almost identical to those recommended by the "Working Committee on Utilities" of the President's Council on Recreation and Natural Beauty in its Report of December 27, 1968. The success of implementing these guidelines clearly indicates their soundness and practicality in achieving a vastly improved environmental impact with a minimum of extra cost and without undergrounding. In reviewing these three projects on the ground and in discussion with the government agency and utility company personnel involved in the projects, certain obstacles to carrying out these guidelines become apparent. They are as follows:

1. Differences in jurisdiction and intent of agencies managing the public lands and consequent lack of agency coordination.
2. Lack of Federal policy regarding use impact on ecology and aesthetics, spelled out by Congress, applying to all lands owned by the Federal government.
3. Historic emphasis on factors other than ecology and aesthetics by the managing agency. For example, the "Multiple Use - Sustained Yield Act of 1960" allows and requires equal attention to all factors affecting the National Forests. Traditional emphasis on timber management and production, however, is a factor inhibiting long-term career personnel from making the mental change necessary for considering a much broader multiple-use concept.
4. Lack of trained personnel, at the decision making and working level, to make aesthetic value judgments and to make positive plans for improvement in the ecological and aesthetic areas of the problem.
5. Lack of uniform policy procedures and criteria by the land management agencies and the utility industry in dealing with ecological and aesthetic problems.

6. Lack of clearly stated, positive policy and directives by the Federal Power Commission affecting ecology and aesthetics of primary power lines both on the public and private lands.

7. Lack of funds to staff properly the land management agencies with trained personnel. For example, although the Forest Service has intended to assign a landscape architect on each Forest to deal with power transmission and a host of other problems, funds have not been available.

8. Utility companies are heavily dominated by engineering and cost-oriented personnel with no landscape architects or other aesthetically or ecologically oriented personnel.

9. Federal aircraft regulations require towers and ridgetop lines to be marked for clear sighting by low-flying planes; this marking can cancel efforts by the land management agency to lessen the environmental visual impact.

10. Fire control requirements in areas such as California urge clear-cutting of the right-of-way which tends to continue this aesthetically objectional practice. Fire hazards are considerably less important in areas other than California.

11. Higher costs (in the order of 3% on the Belden-Rock Creek Line and 5-10% on the Henderson Line) are present, but not critically important.

12. Training programs for design-oriented personnel do not exist in the public land management agencies.

CHAPTER III

SUGGESTED ALTERNATIVES FOR THE RESOLUTION OF TRANSMISSION LINE IMPACT PROBLEMS

To resolve these problems it is suggested that ways and means should be found to accomplish the following:

1. Congress should extend the Multiple-Use concept direct to all Federal agencies managing the public lands to consider aesthetic and environmental factors.

2. All Federal agencies dealing with public land and the Federal Power Commission should officially adopt the "Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities" as set forth in the "Working Committee on Utilities" Report to the Vice President and the President's Council on Recreation and Natural Beauty dated December 27, 1968.

3. The position of Multi-Use Coordinator, as exemplified by that position in each Regional Office of the Forest Service, should be given a stronger role and should be extended to the regional staffs of all Federal agencies managing the public lands.

4. Seminars and training sessions should be conducted by personnel from the Forest Service who have experience in solving transmission line impact problems to expand this expertise throughout all Federal land management agencies. Those trained persons are logically the landscape architects in the agency whose principal training and function is to make land planning and land aesthetics value judgments. In the absence of trained staff personnel, agencies should be enabled and funded to commission private consultants on a project-by-project basis. Under no circumstances should transmission line projects be undertaken without trained professional advice.

5. The Federal Power Commission should adopt the Guidelines of the "Working Committee on Utilities" for private as well as public lands.

6. The Federal Power Commission should allow reasonable extra costs above conventional construction methods of transmission line installation for environmental considerations as a normal cost of doing business.

7. Fire hazard requirements should be evaluated on an area basis and modified to allow for environmental factors if at all possible.

8. There should be guidelines and criteria established to lessen environmental impact but no set rules that must be applied to all situations. Leeway should be allowed for trained personnel or consultants from the Federal land agencies to work out problems with the utility company on the project site. Heavy responsibility should be placed on the landscape architect to render final aesthetic value judgments.

9. The Federal Power Commission and the Federal public land agencies should require utility companies traversing the public lands with transmission lines to present a workable long-range plan, capable of being accomplished at reasonable cost and in a reasonable time to convert all existing transmission lines to the provisions of the Guidelines of the "Working Committee on Utilities."

10. Seminars should be held periodically by representatives of the public land agencies and the electric utility companies to discuss transmission line impact problems and methods of solving them.

APPENDIX I

References and Resource People Used for This Report

For the "Henderson Line"

James Hagemier, Landscape Architect, U.S. Forest Service, Golden, Colorado.

Ralph Sargent, Jr., Vice President, Public Service Company of Colorado, Denver, Colorado.

Richard Walker, Vice President, Public Service Company of Colorado, Denver, Colorado.

John Martin, Manager of Engineering, Public Service Company of Colorado, Denver, Colorado.

C. A. Henry, Director of Real Estate, Public Service Company of Colorado, Denver, Colorado.

Georg Treichel, Professor of Ecology, San Francisco State College, San Francisco, California.

Dr. Hugo Ferchau, Professor of Ecology, Western State College, Gunnison, Colorado.

For the "Swan Valley-Teton Line"

Robert L. Safran, Forest Supervisor, Teton National Forest, Jackson, Wyoming.

Ernest Hirsch, Forester, Recreation and Lands, Teton National Forest, Jackson, Wyoming.

Roy Morgan, Forester, Project Coordinator, Teton National Forest, Jackson, Wyoming

For the "Belden-Rock Creek Line"

Robert E. Heyden, Supervisor, Recreation Planning Land Department, Pacific Gas and Electric Co., San Francisco, California.

Ray Collins, Landscape Architect, Regional Forester's Office, U.S. Forest Service, San Francisco, California.

A. R. Todd, Manager, Government and Public Affairs Dept., Pacific Gas and Electric Co., San Francisco, California.

W. R. Johnson, Manager of Transmission Lines, Pacific Gas and Electric Company, San Francisco, California.

K. J. Diercks, Executive Representative, Pacific Gas and Electric Co.,
San Francisco, California.

Publications

Annual Report to the President and to the President's Council on Recreation and Natural Beauty by the Citizens Advisory Committee on Recreation and Natural Beauty, June, 1968.

The Electric Utility Industry and the Environment. A report to the Citizens Advisory Committee on Recreation and Natural Beauty by the Electric Utility Industry Task Force on Environment, July, 1968.

Report to the Vice President and to the President's Council on Recreation and Natural Beauty, by the Working Committee on Utilities, December 27, 1968.

Energy-Economics and the Environment. Proceedings of a conference sponsored by the Committee on Environment, Edison Electric Institute, Chicago, Illinois, 1968.

A Report on Appearance Planning. A report to the Bonneville Power Administration setting forth guidelines for utility structures, Stanton, Boles, Maguire and Church, Architects, May, 1966.

Vegetation Management for Rights-of-Way, Eastern Region, Forest Service, U.S. Department of Agriculture.

A Guide to Hazard Reduction and Fire Prevention Measures for Power Lines. Regional Forester, U.S. Forest Service and the Resources Agency, Division of Forestry, State of California, April, 1964.

Forest Landscape Description and Inventories. A basis for land planning and design, Professor R. Burton Litton, Department of Landscape Architecture, University of California, USDA Forest Service Research Paper, PSW - 49, 1968.

Multiple Use - Sustained Yield Act of June 12, 1960 (74 Stat. 215, 16 U.S.C. 528-531). It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The purposes of this Act are declared to be supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the Act of June 4, 1897 (16 U.S.C. 475). Nothing herein shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish on the national forests. Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest lands or to affect the use or administration of Federal lands not within national forests.

APPENDIX II

PHOTOGRAPHS

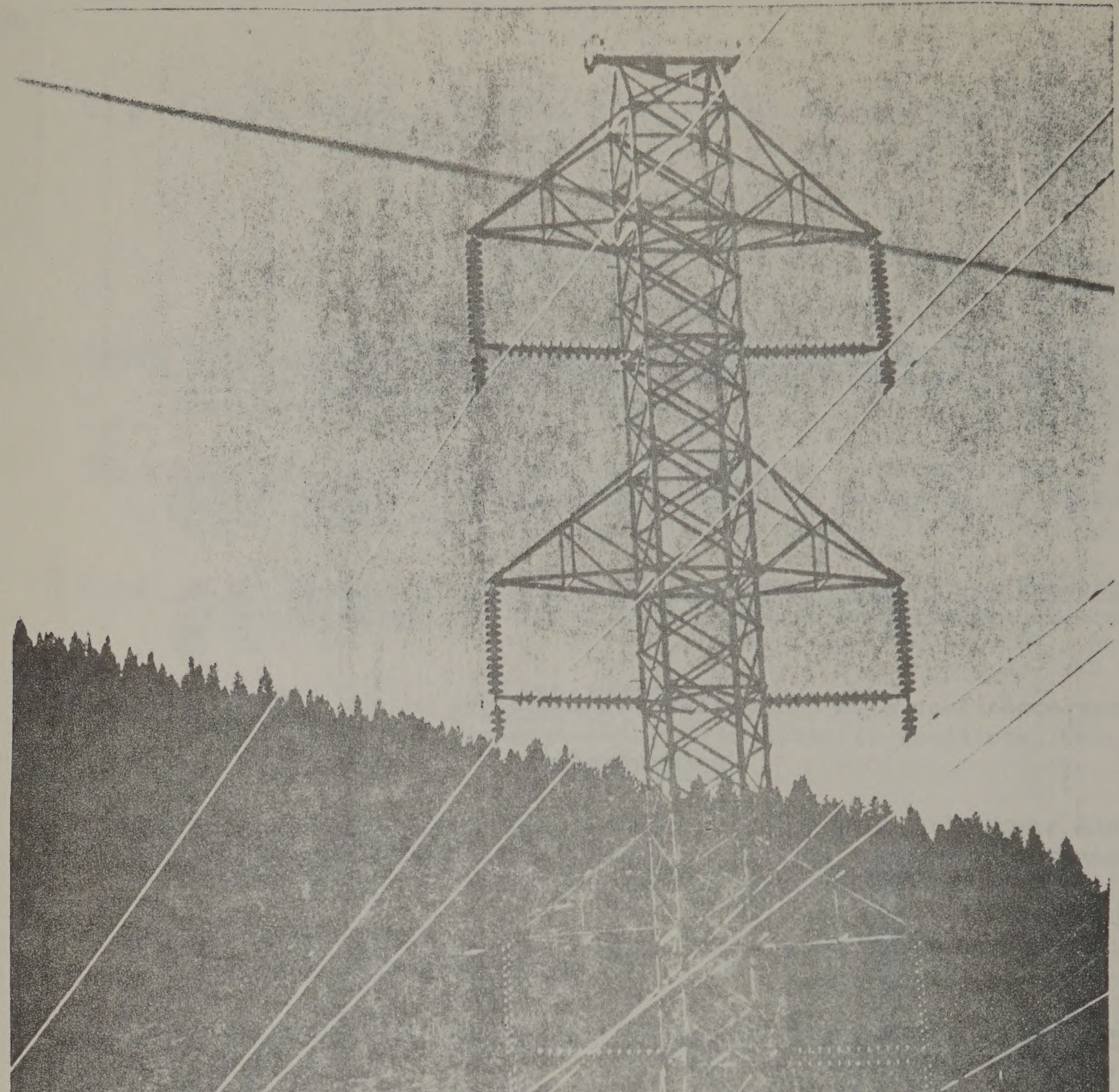

Fig. 1. The prime source of impact.

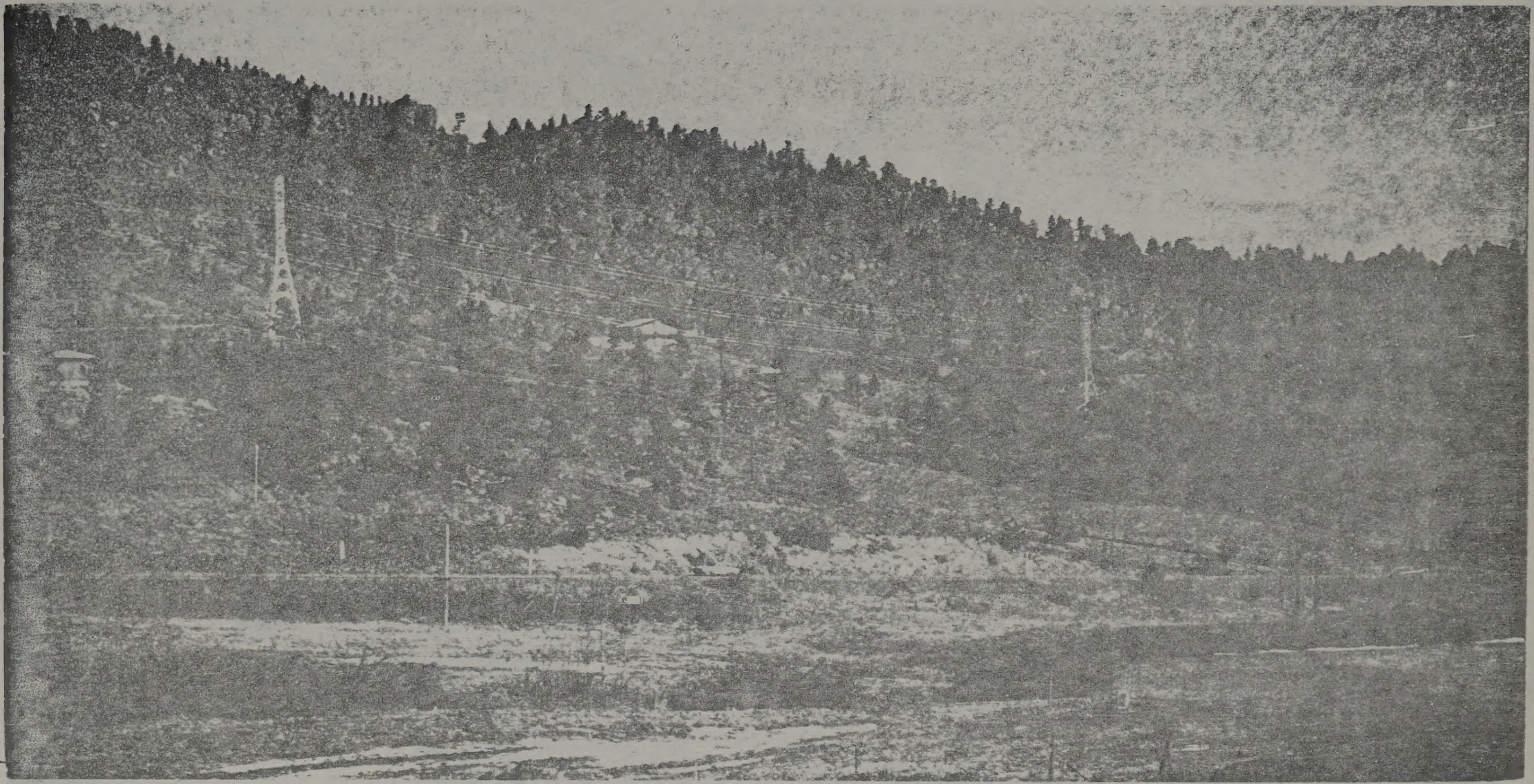

Fig. 2. Galvanized steel towers and highly reflective conductor stand uncompromisingly against the hills as seen from the highway.

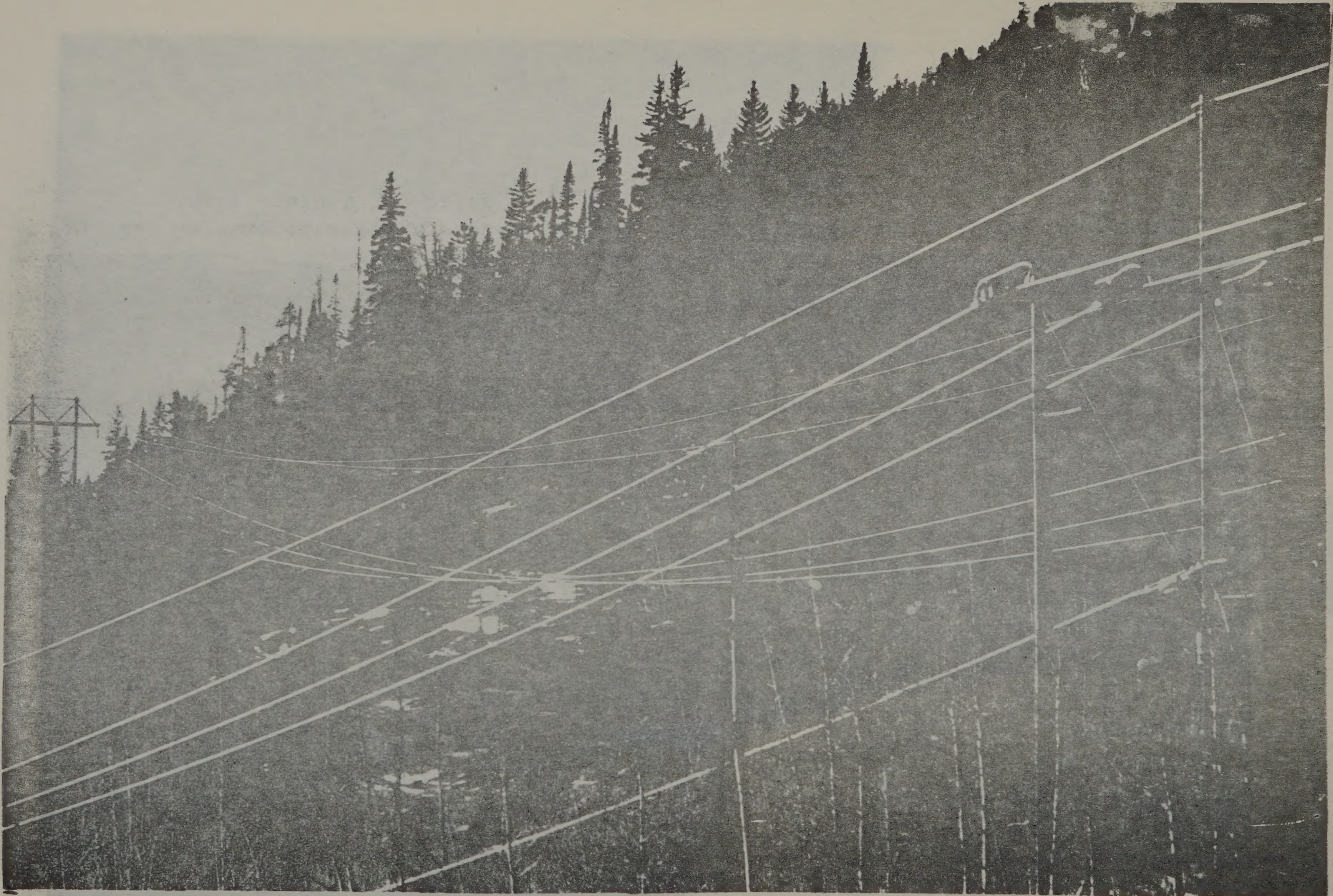

Fig. 3. Aluminum cables on distribution lines along edge of Highway 40 in Colorado illustrate high scenic impact of typical line as seen by driver.

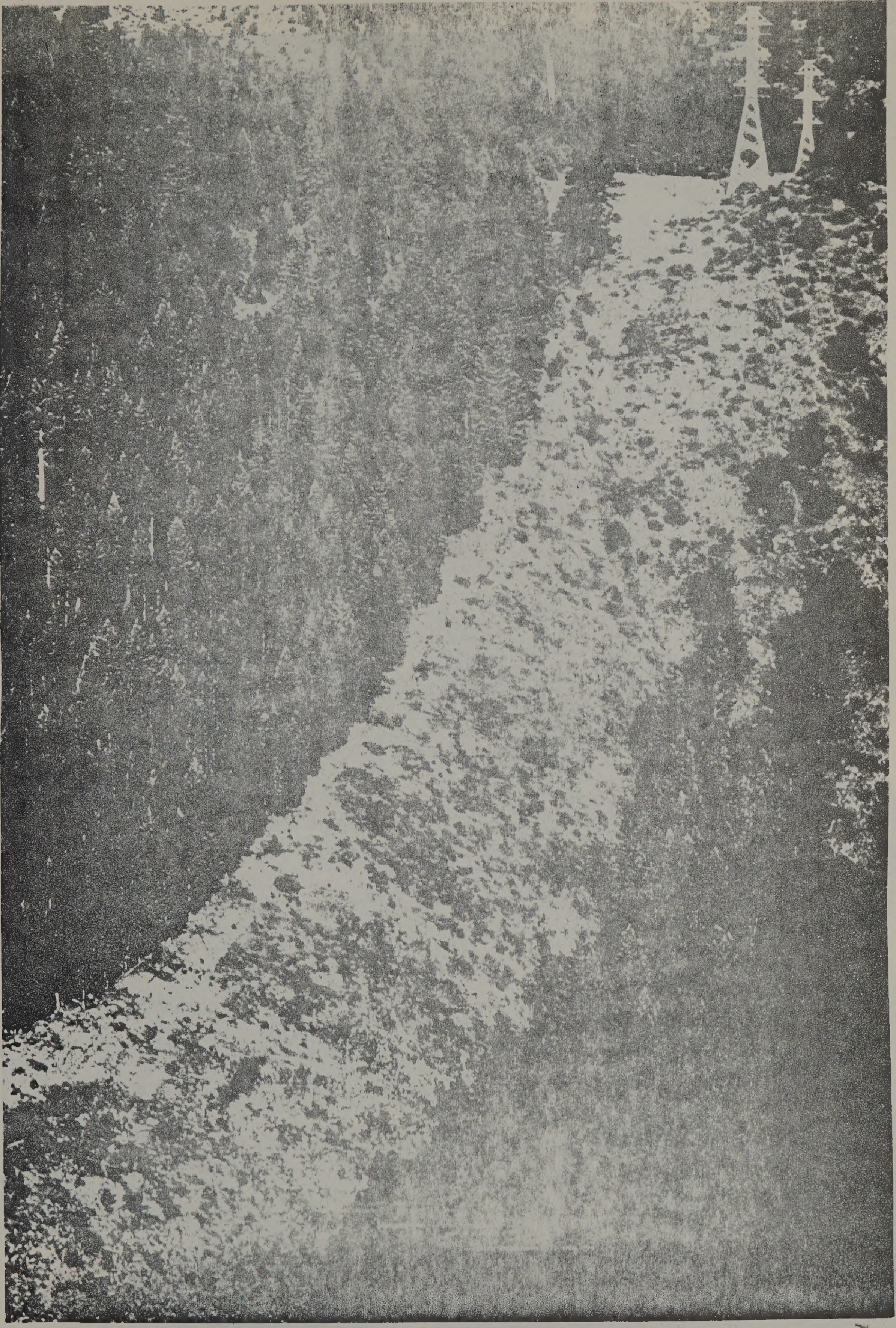

Fig. 4 . Clear-cut, straight-edged swath through forest under old transmission lines in Colorado. Available clearances between treetops and conductors make this practice here completely unnecessary.

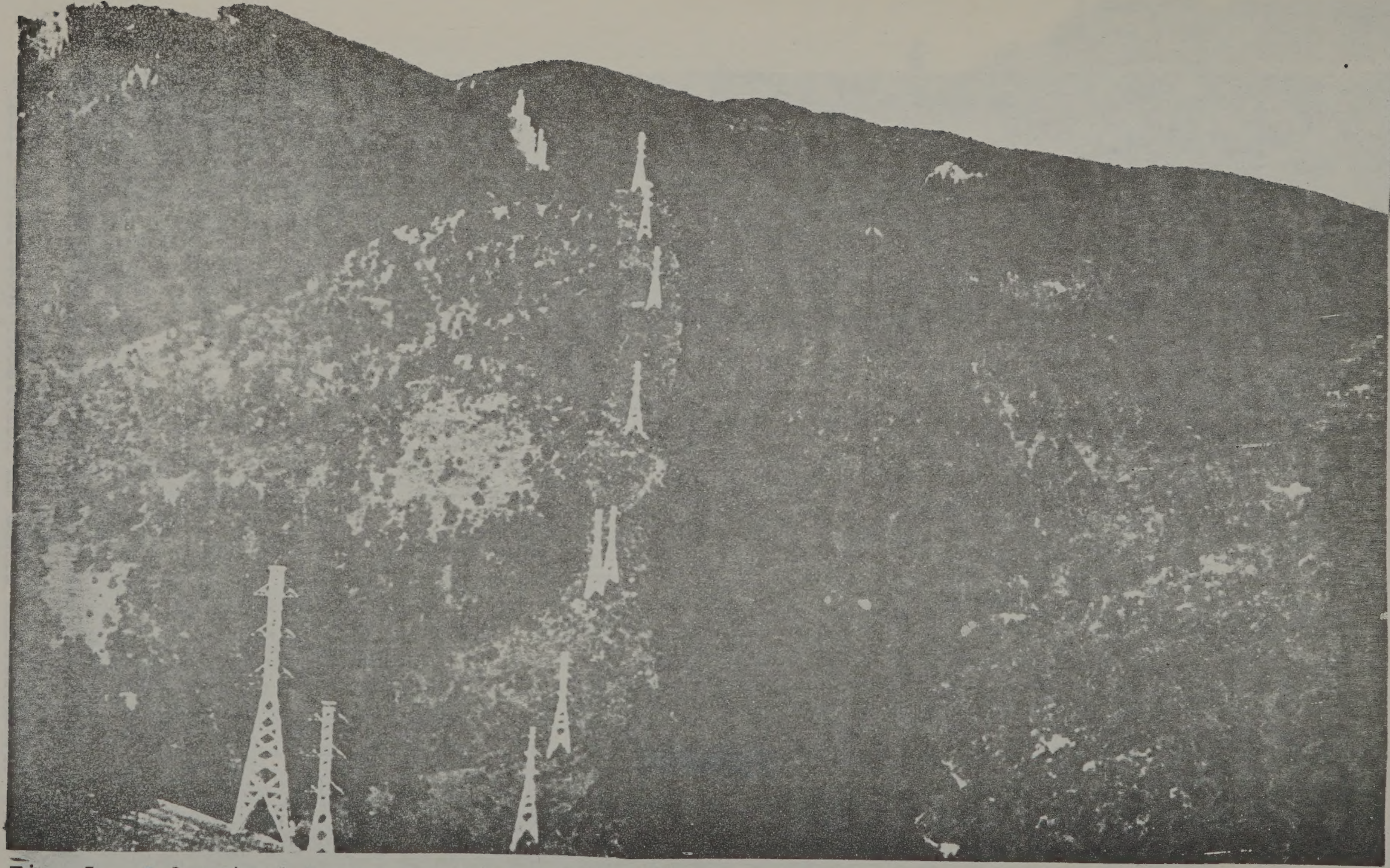

Fig. 5. Galvanized towers marching arbitrarily across ridge tops through a clear-cut swath. No attempt to adapt to landscape.

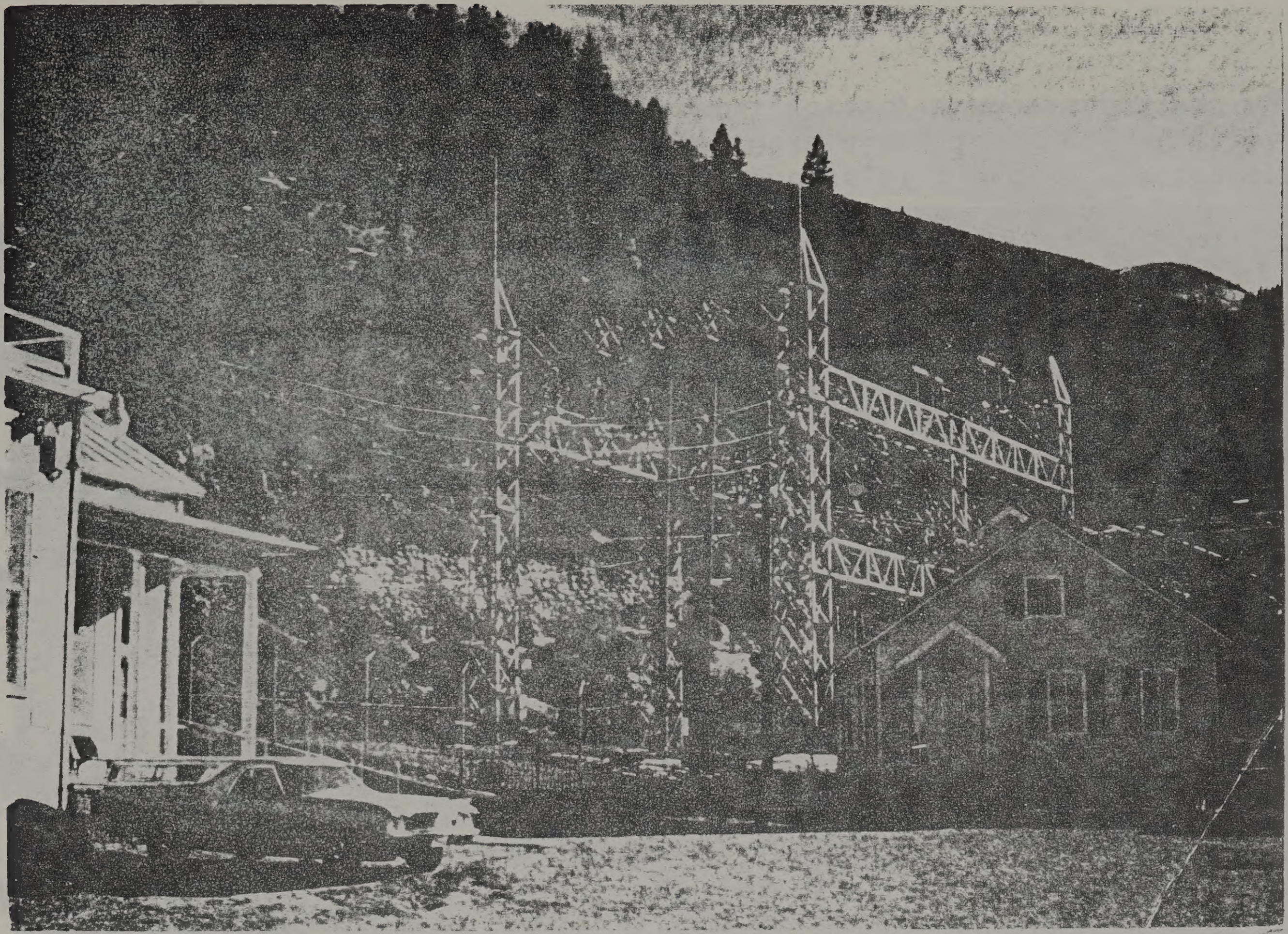

Fig. 6. Galvanized substation in historic Georgetown, Colorado. No effort made to adjust appearance by painting, screening or low-profile structure to lessen visual impact on historic town.

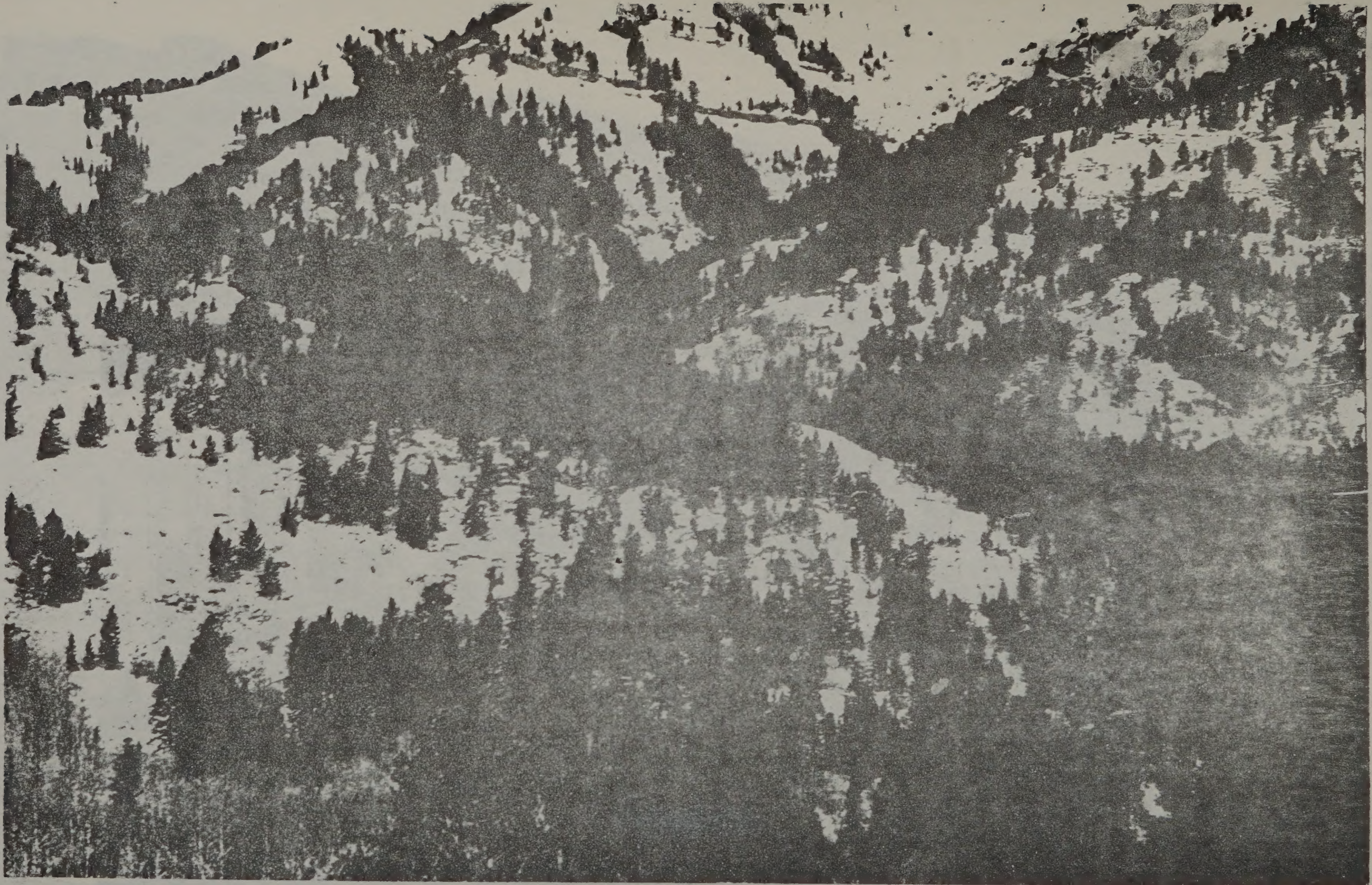

Fig. 7. Route selection is first major step in process of reducing environmental impact. Swan Valley-Teton Line entering Jackson Hole along lower end of Phillips Ridge. Line is barely discernable. Teton National Forest, Bonneville Power Administration.

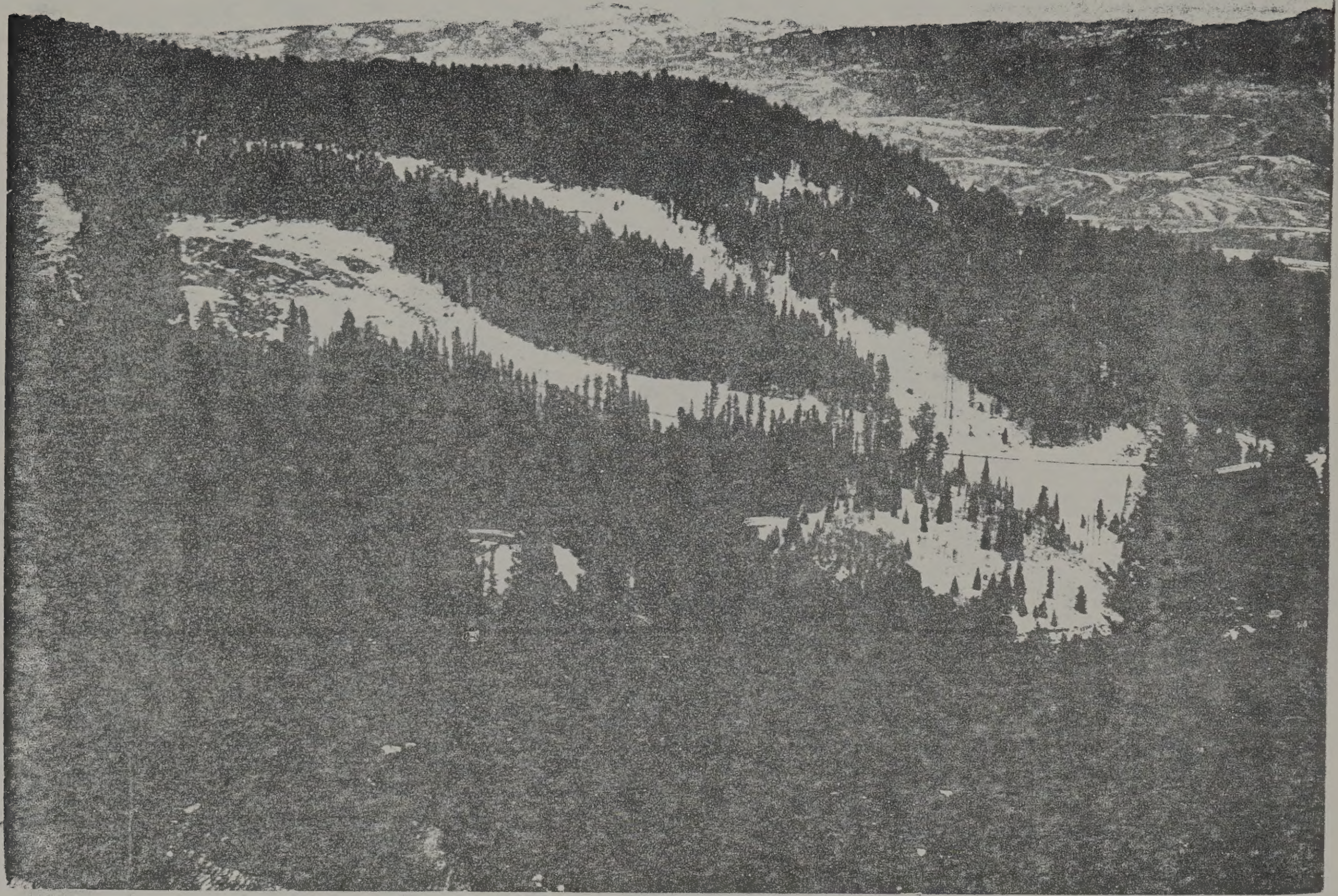

Fig. 8. Upper irregular cleared strip is Swan Valley-Teton Line on backside of Phillips Ridge, out of View of Jackson Hole. Cut below Line is new highway over Teton Pass. Trees between line and new road will shield line from motorists. Teton National Forest, Wyoming. Bonneville Power Administration.

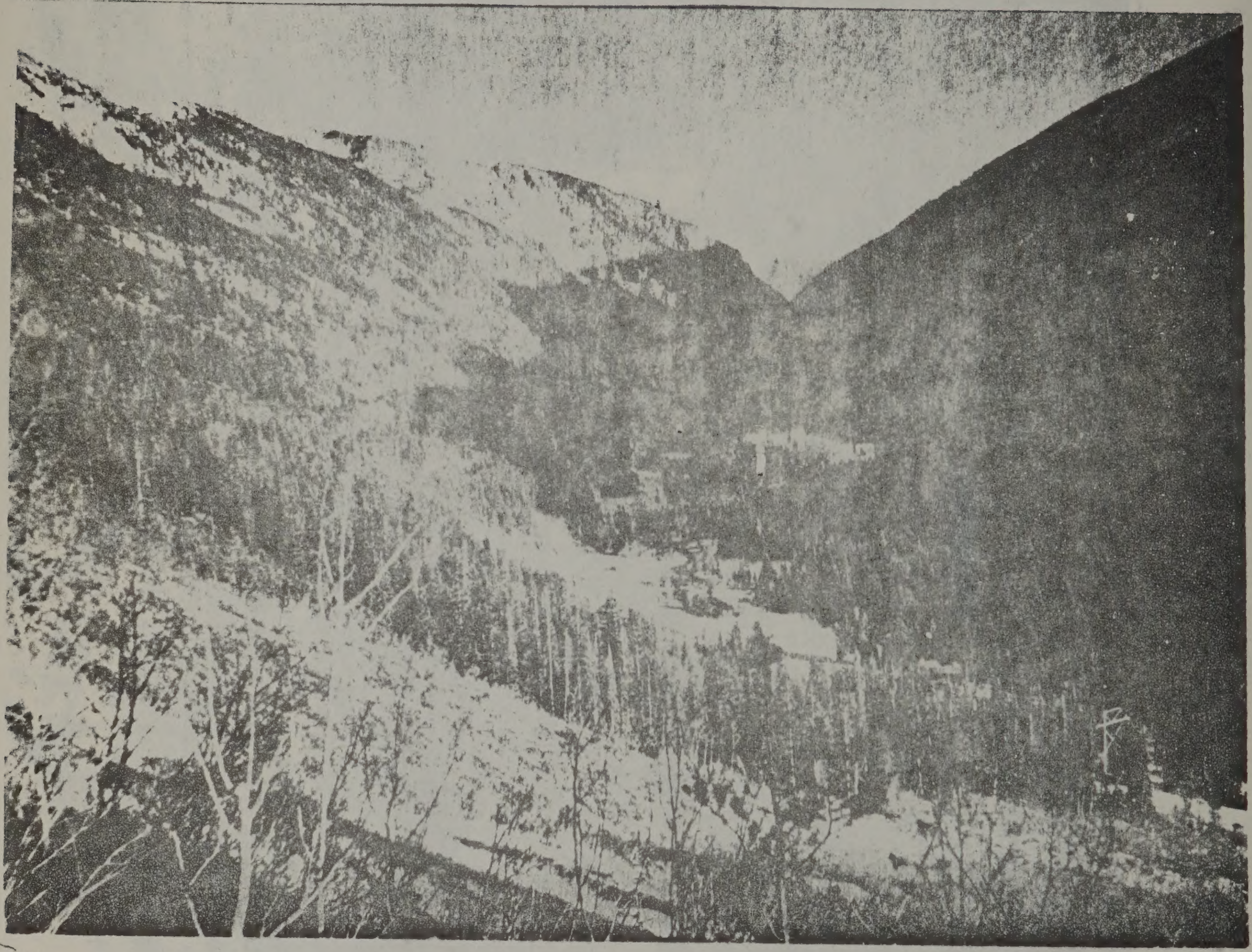

Fig. 9. New "Henderson Line" on left side of Highway 40, Colorado. Wood poles and non-specular conductors up-hill and with tree barrier between line and highway conceals line from motorists on this scenic highway. Arapaho National Forest, Public Service Company of Colorado.

Fig. 10. Partially painted galvanized steel tower illustrates effect of carefully selected paint color in blending tower into landscape background and reducing impact. "Henderson Line," Colorado.

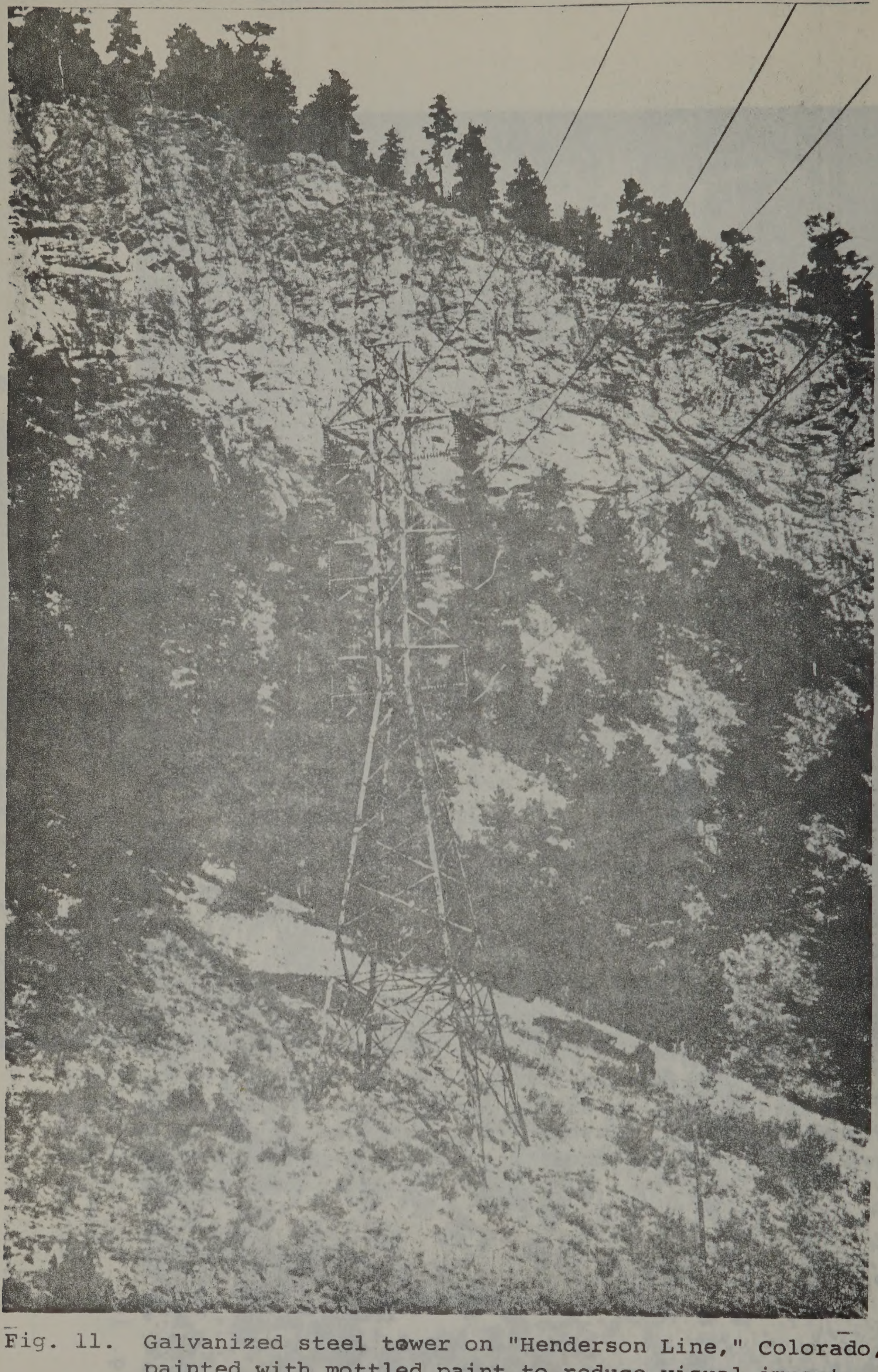

Fig. 11. Galvanized steel tower on "Henderson Line," Colorado, painted with mottled paint to reduce visual impact.

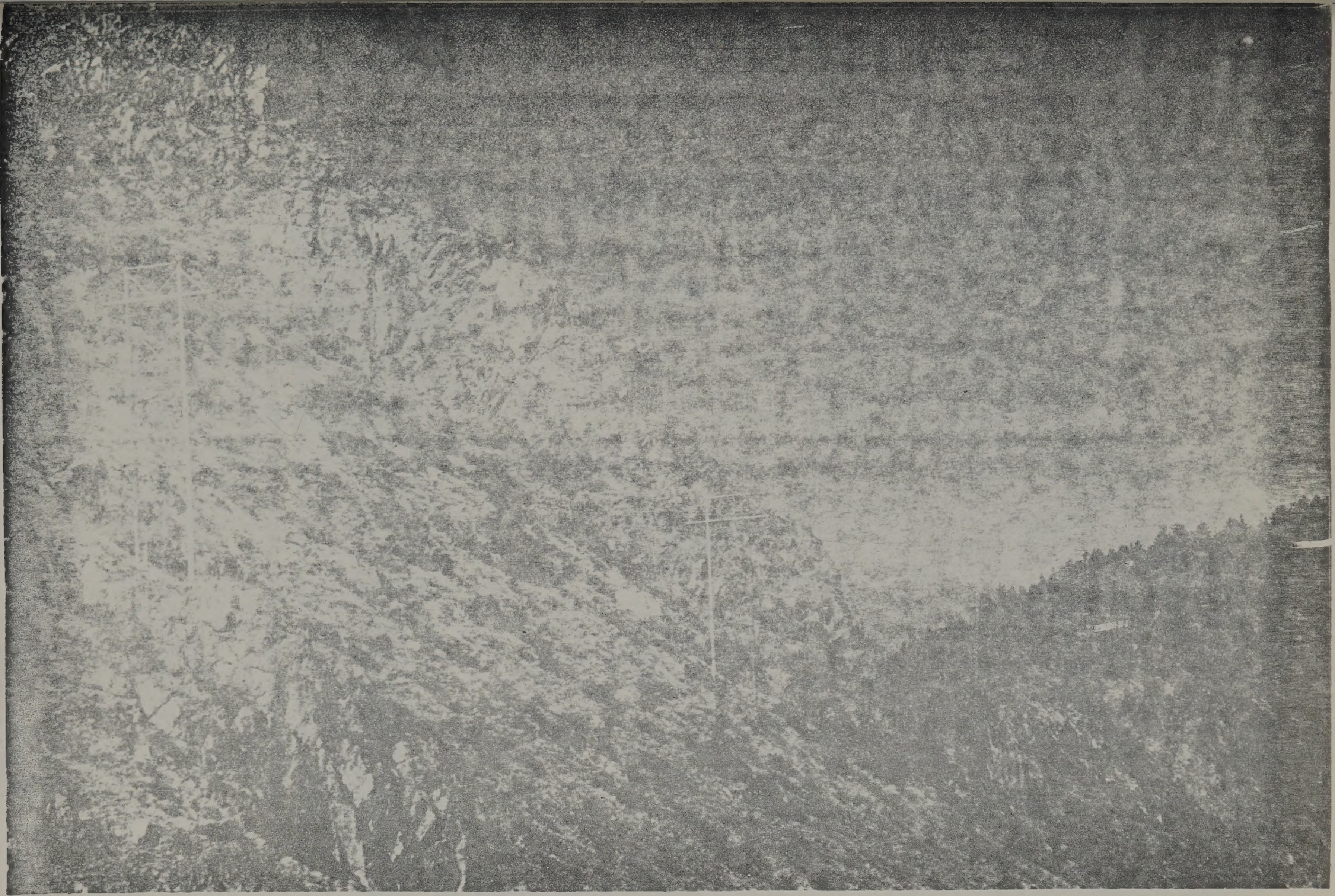

Fig. 12. Wooden poles stained to blend with background on Henderson Line along Clear Creek near Georgetown, Colorado. Public Service Co. of Colorado.

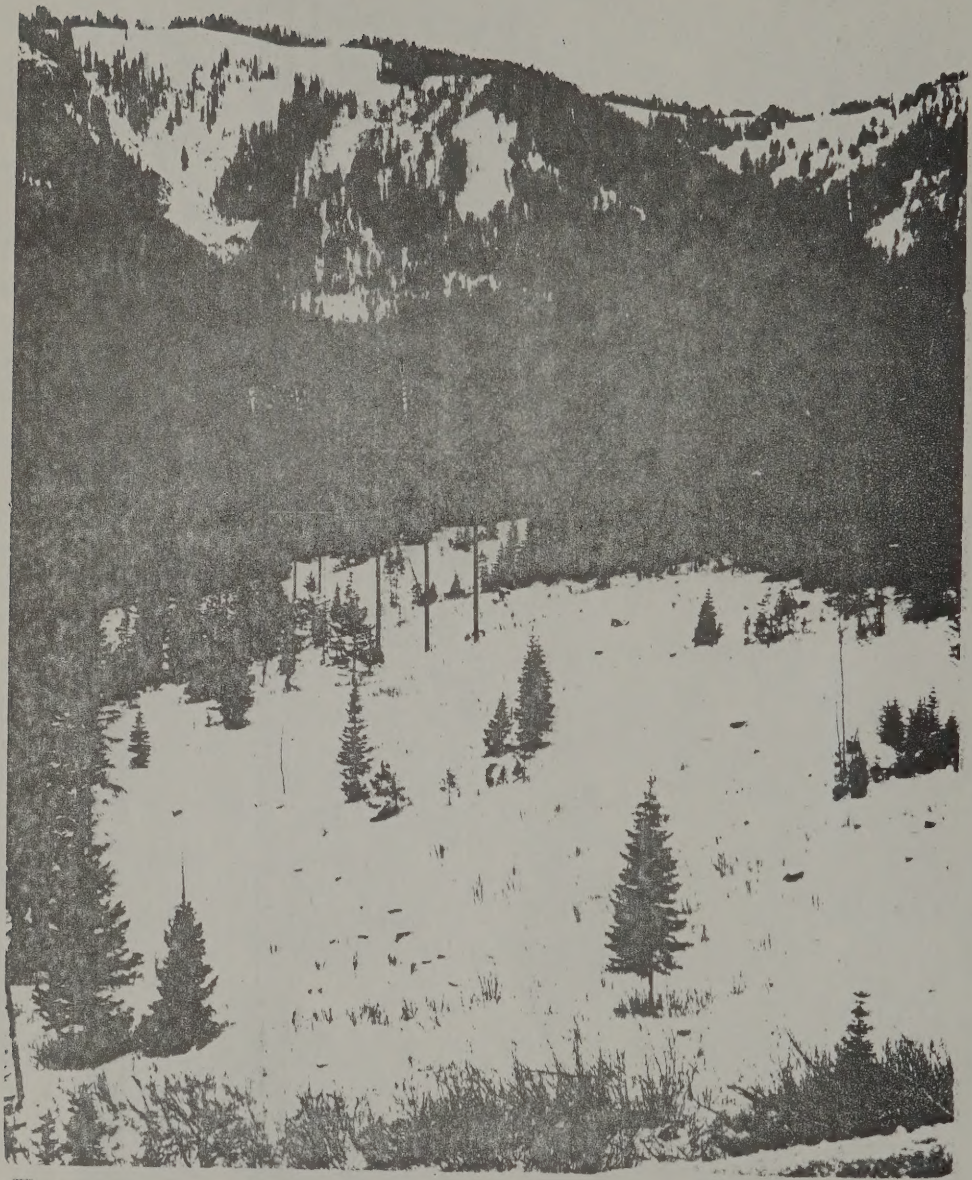

Fig. 13, Non-specular conductors cross highway at right angles with wooden towers set well back from highway edge on "Swan Valley-Teton Line" in the Teton National Forest.

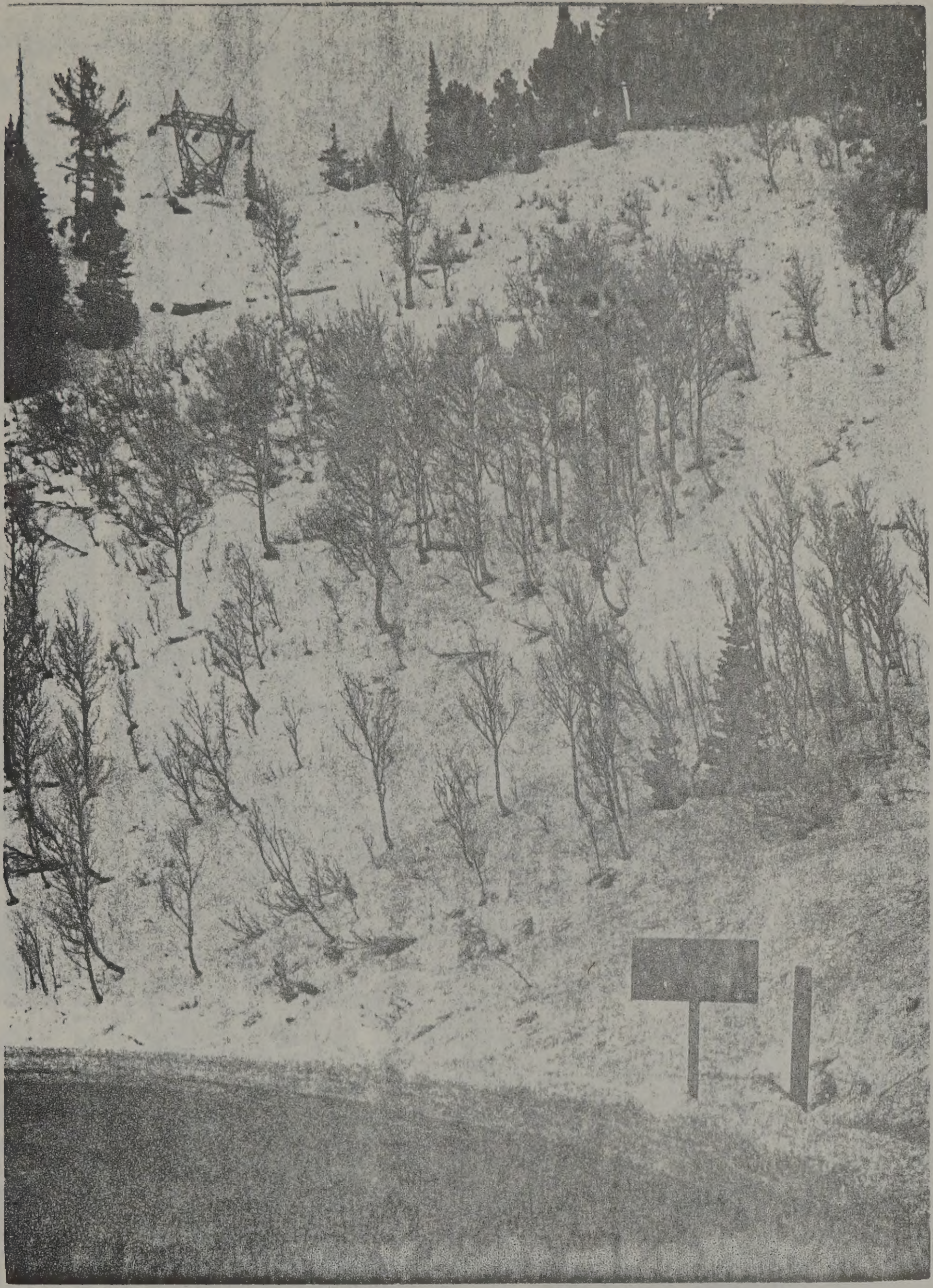

Fig. 14. Steel tower located below ridge top. Aspens in foreground will grow to shield tower from view of road. "Swan Valley-Teton Line", Jackson, Wyoming. Teton National Forest. Bonneville Power Administration.

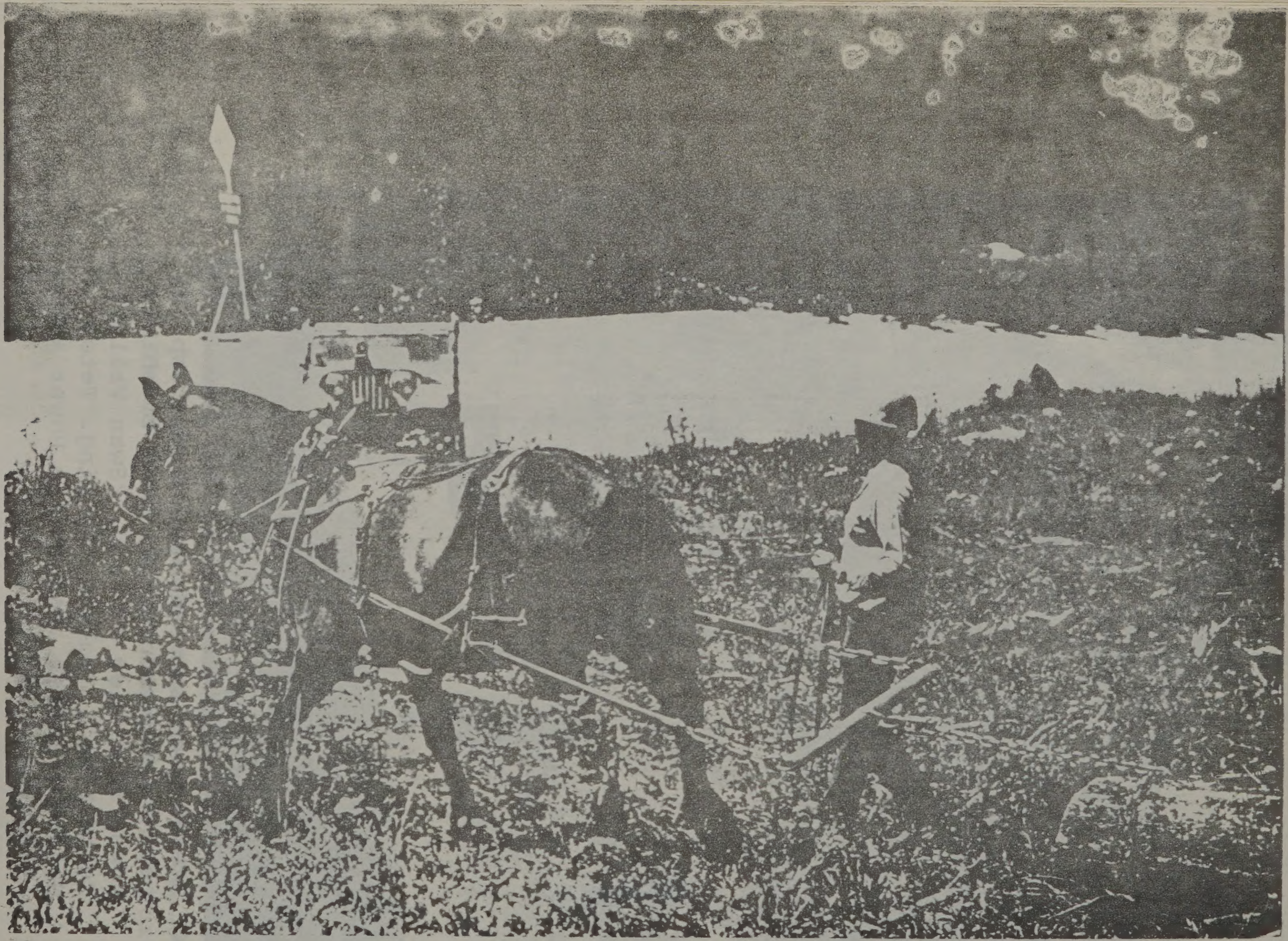

Fig. 15. To reduce erosion and destruction of vegetation, horses were used on the "Henderson Line" to drag burnable timber off mountain and down to edge of highway. Wood was then hauled away by motorists for firewood at no expense to contractor.

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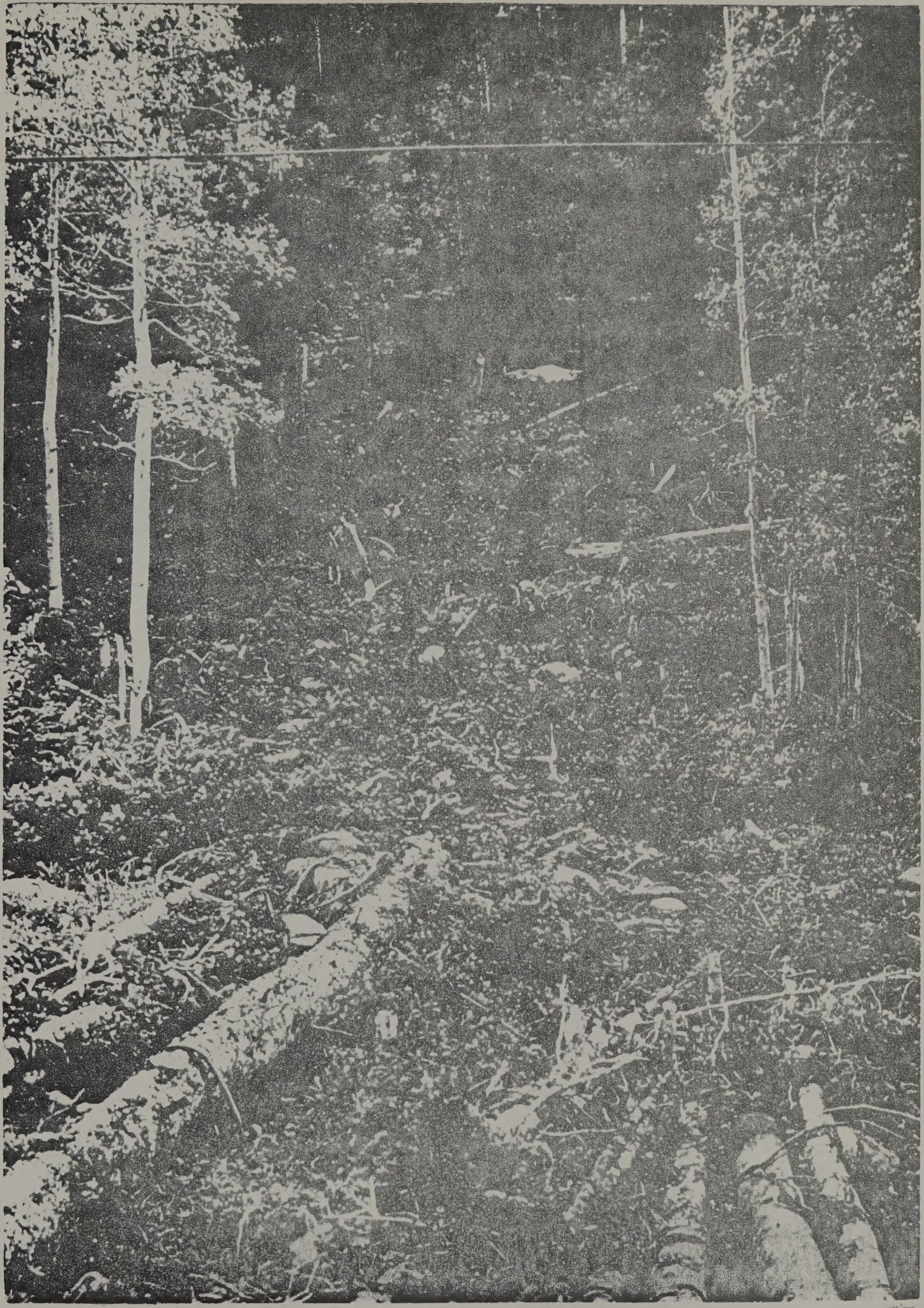


Fig. 16. Trail to haul cut wood from right-of-way to highway can regenerate quickly due to use of horses rather than bulldozers.

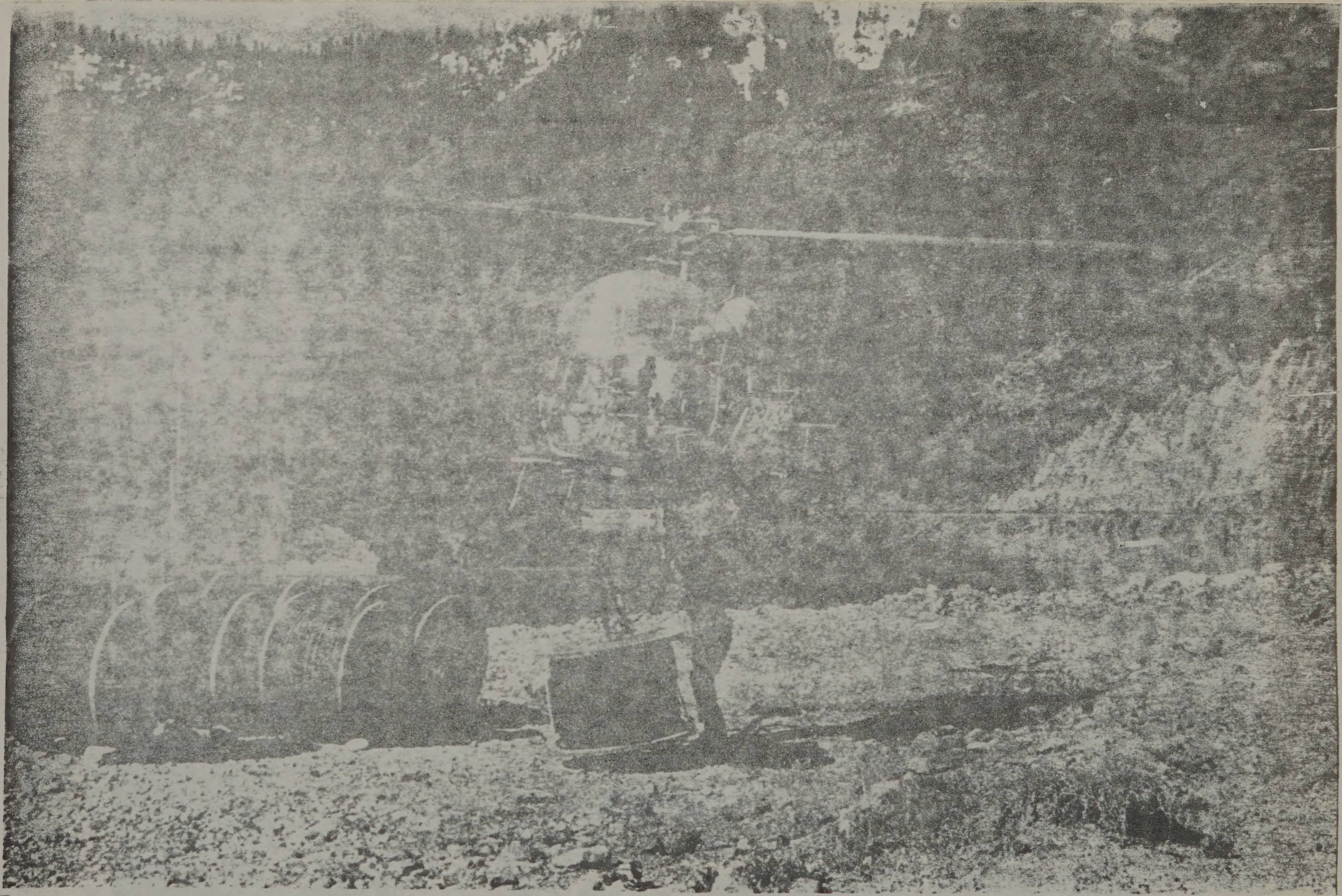


Fig. 17. Helicopter picking up spool of lead wire to thread conductors onto towers to avoid cutting in right-of-way. "Belden-Rock Creek Line" of the Pacific Gas and Electric Company, Plumas National Forest, California.

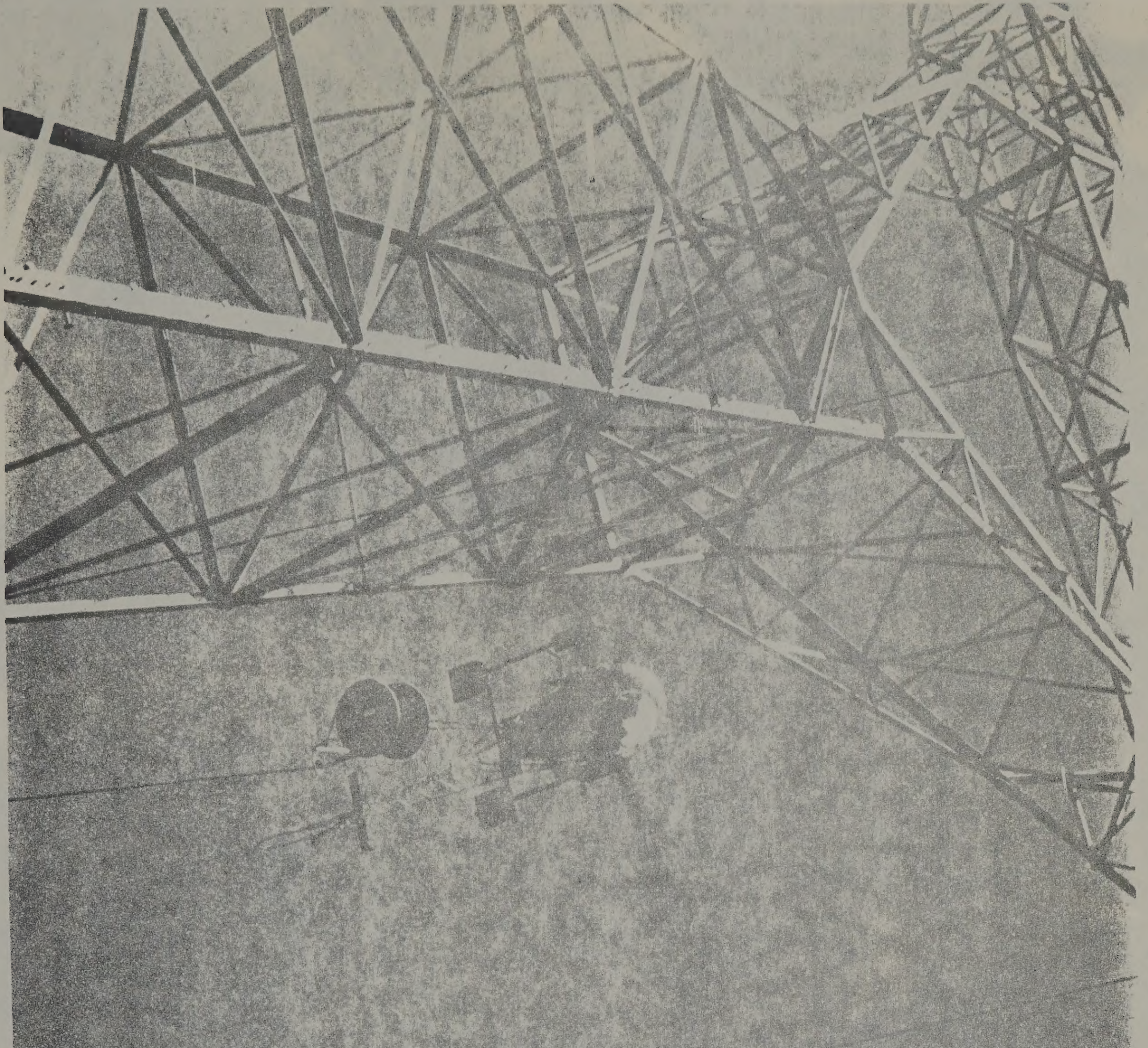


Fig. 18. Helicopter threading lead line to tower. Conductor will be pulled through by truck winch at carefully selected sites as much as three miles away on the right-of-way. "Belden-Rock Creek Line" of the Pacific Gas and Electric Co., Plumas National Forest, California.

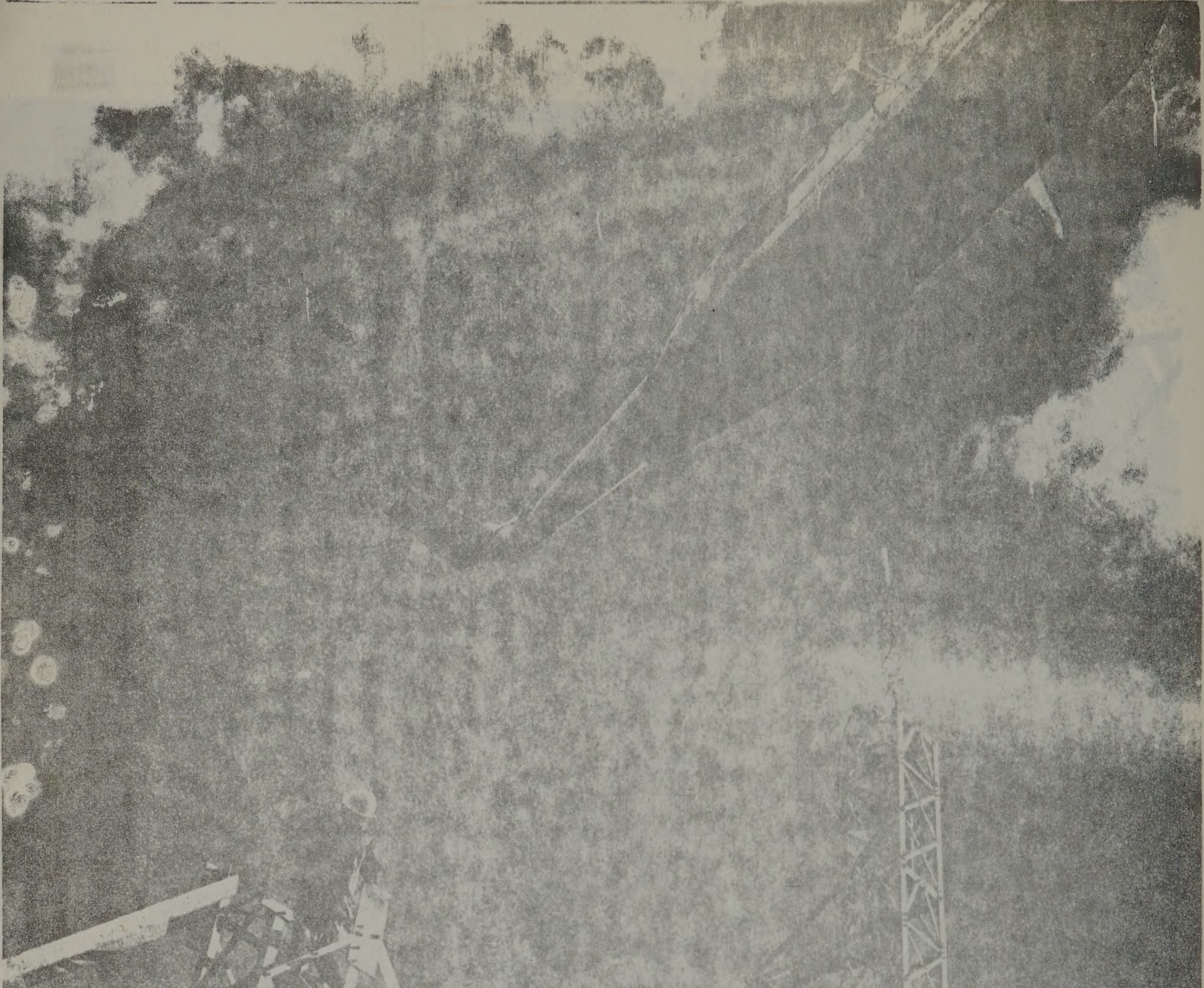


Fig. 19. Large helicopter lowering pre-assembled aluminum tower sections into place on the "Henderson Line" in Colorado on the Arapaho National Forest.

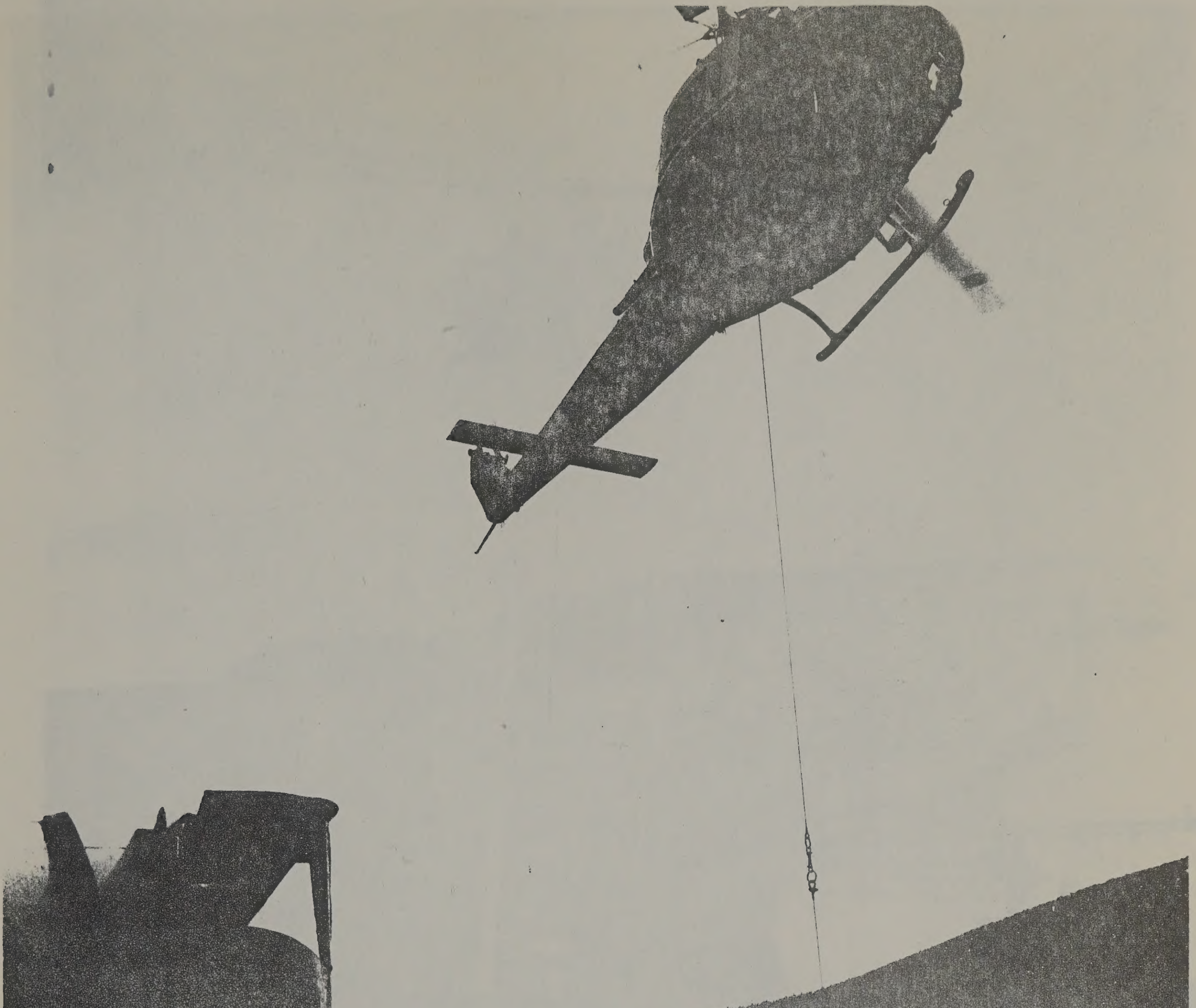


Fig. 20. To avoid truck roads to tower sites, helicopter delivers concrete to site for tower footings. "Henderson Line" Public Service Co. of Colorado on the Arapaho National Forest.

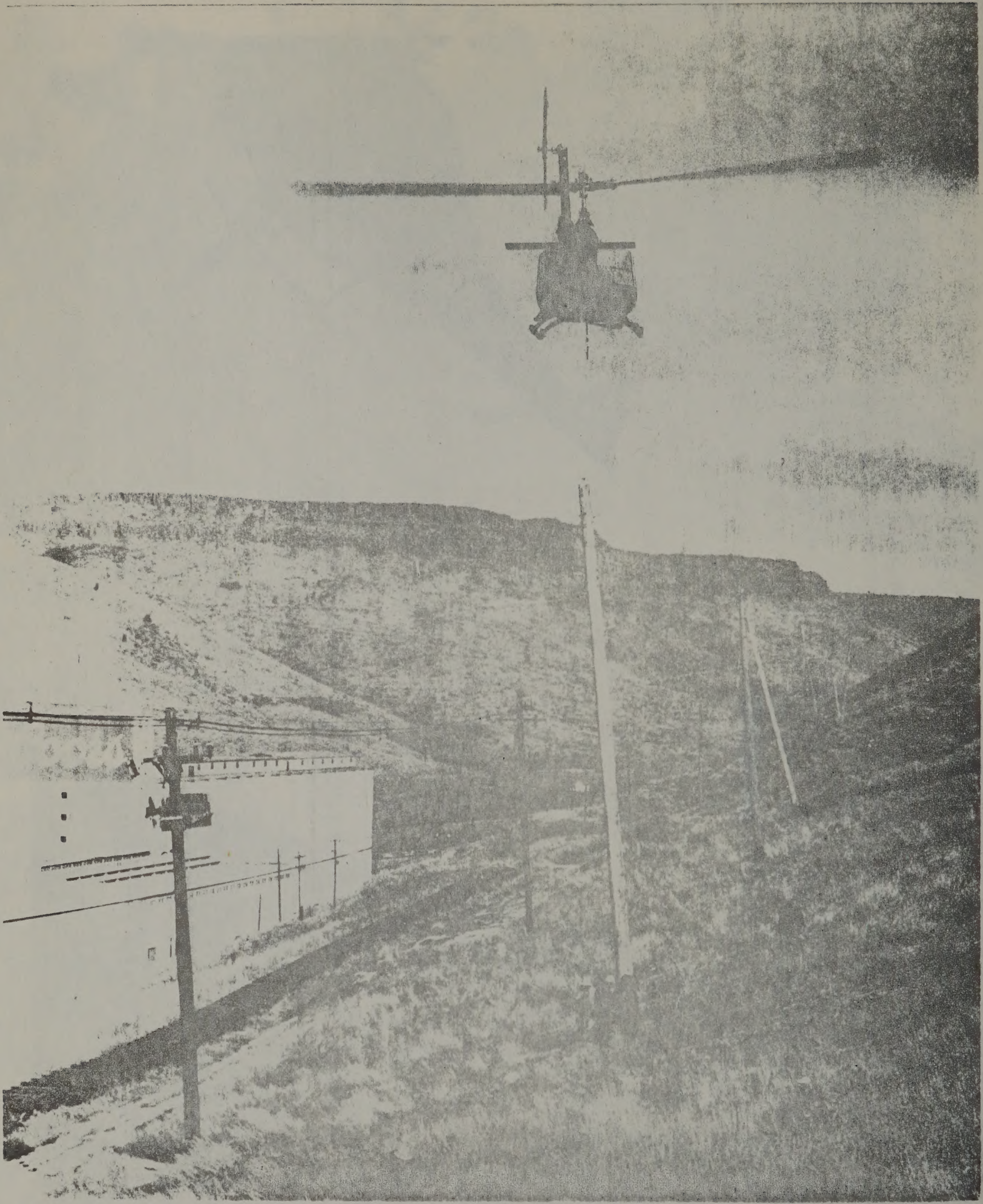


Fig. 21. Tower poles delivered and placed into holes by helicopter.

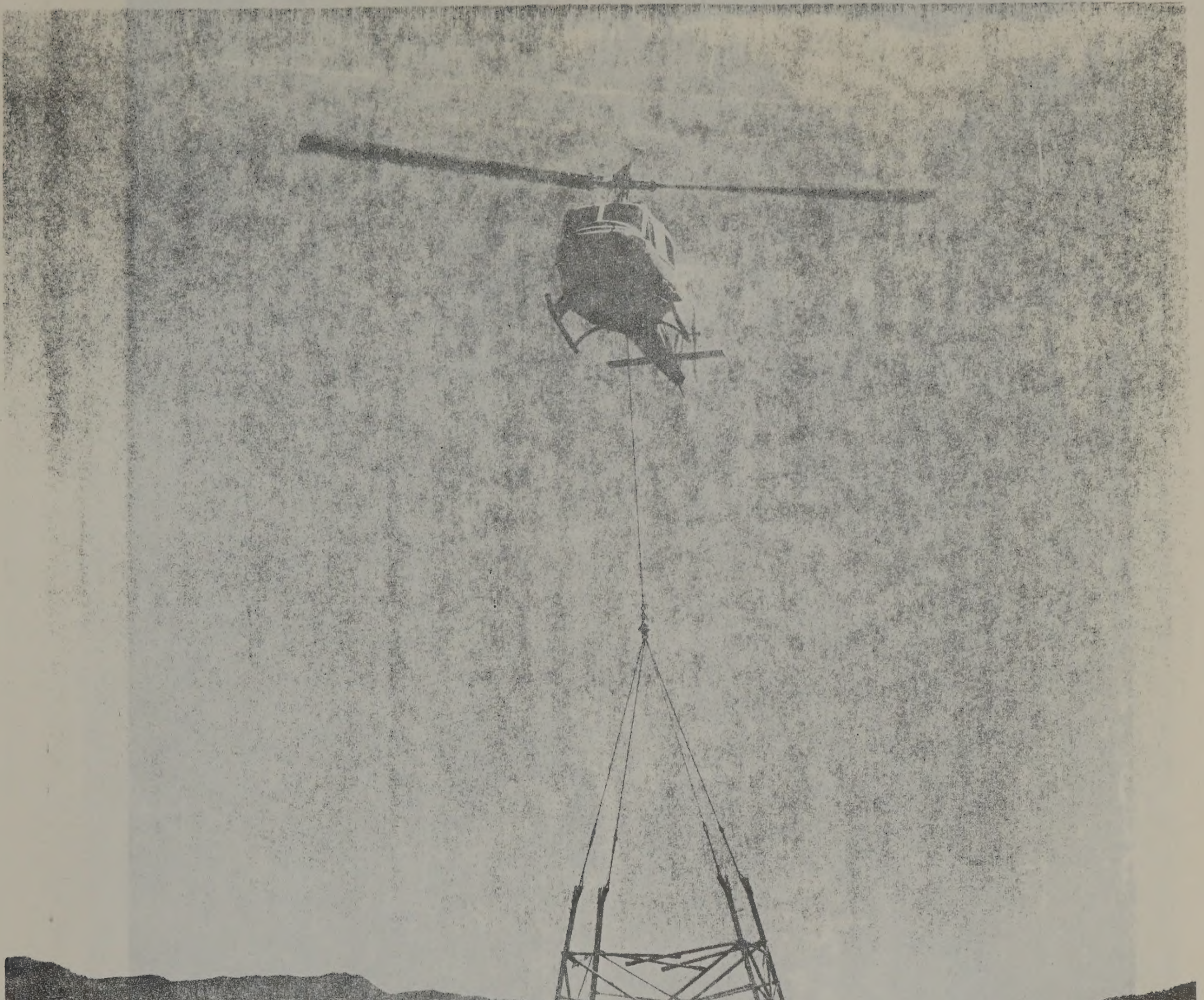


Fig. 22. Pre-assembled aluminum tower sections being lifted by helicopter from storage depot for delivery to site on "Henderson Line" of Public Service Co. of Colorado on the Arapaho National Forest.

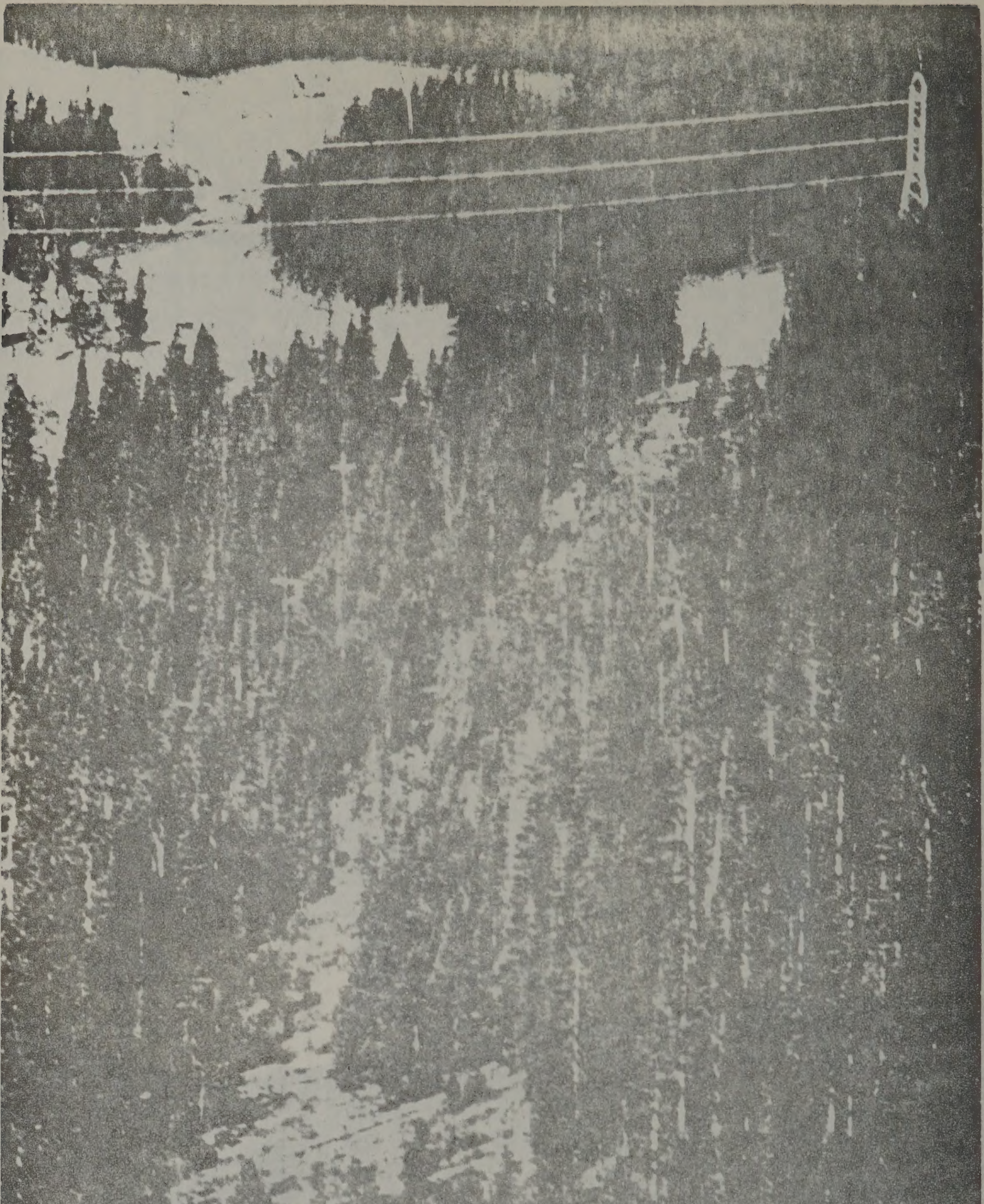


Fig. 23. Irregular edged cut through forest on new "Henderson Line" "feathers" edge and leaves small trees in right-of-way. Arapaho National Forest. Line at top is old transmission line.

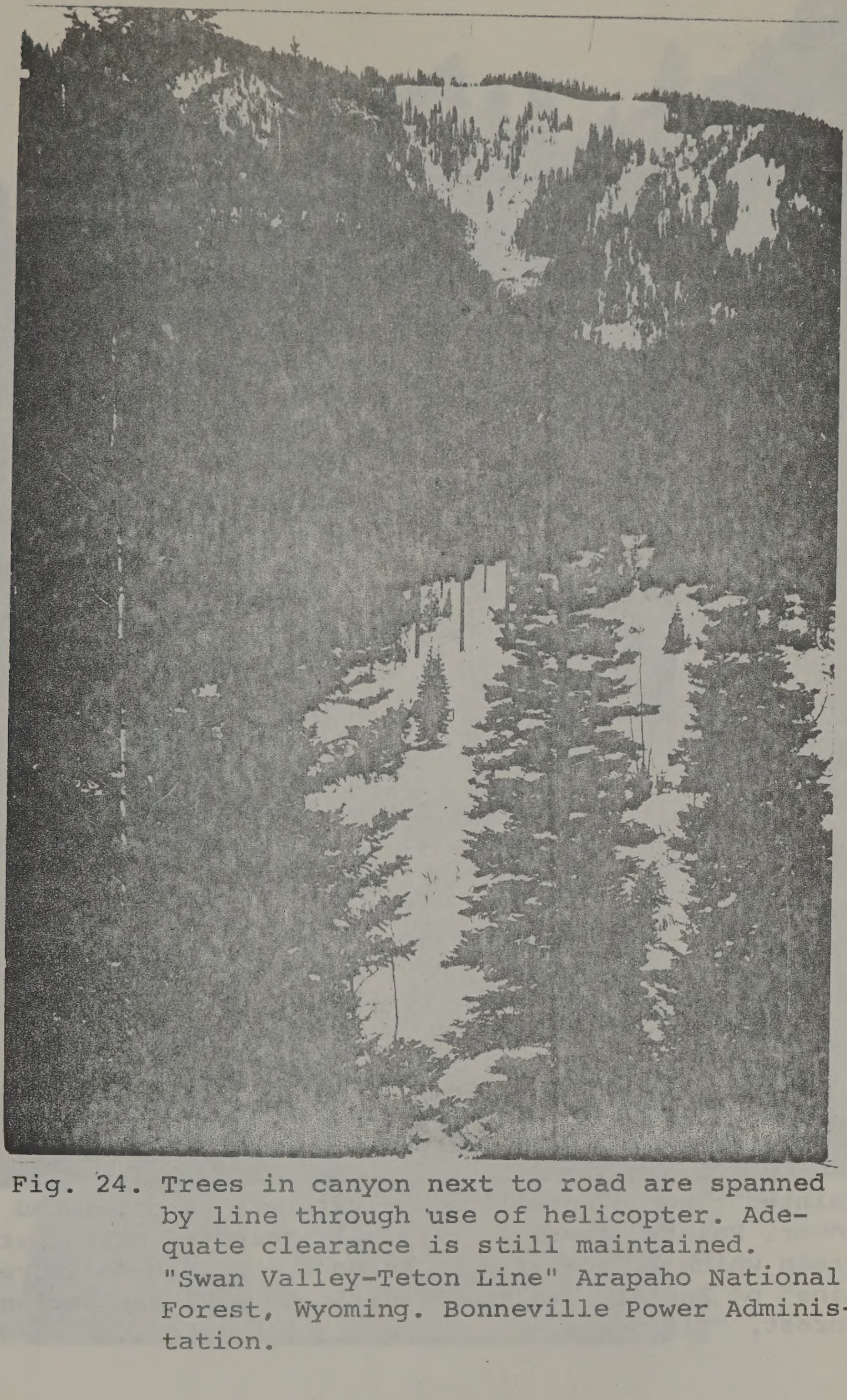


Fig. 24. Trees in canyon next to road are spanned by line through use of helicopter. Adequate clearance is still maintained. "Swan Valley-Teton Line" Arapaho National Forest, Wyoming. Bonneville Power Administation.

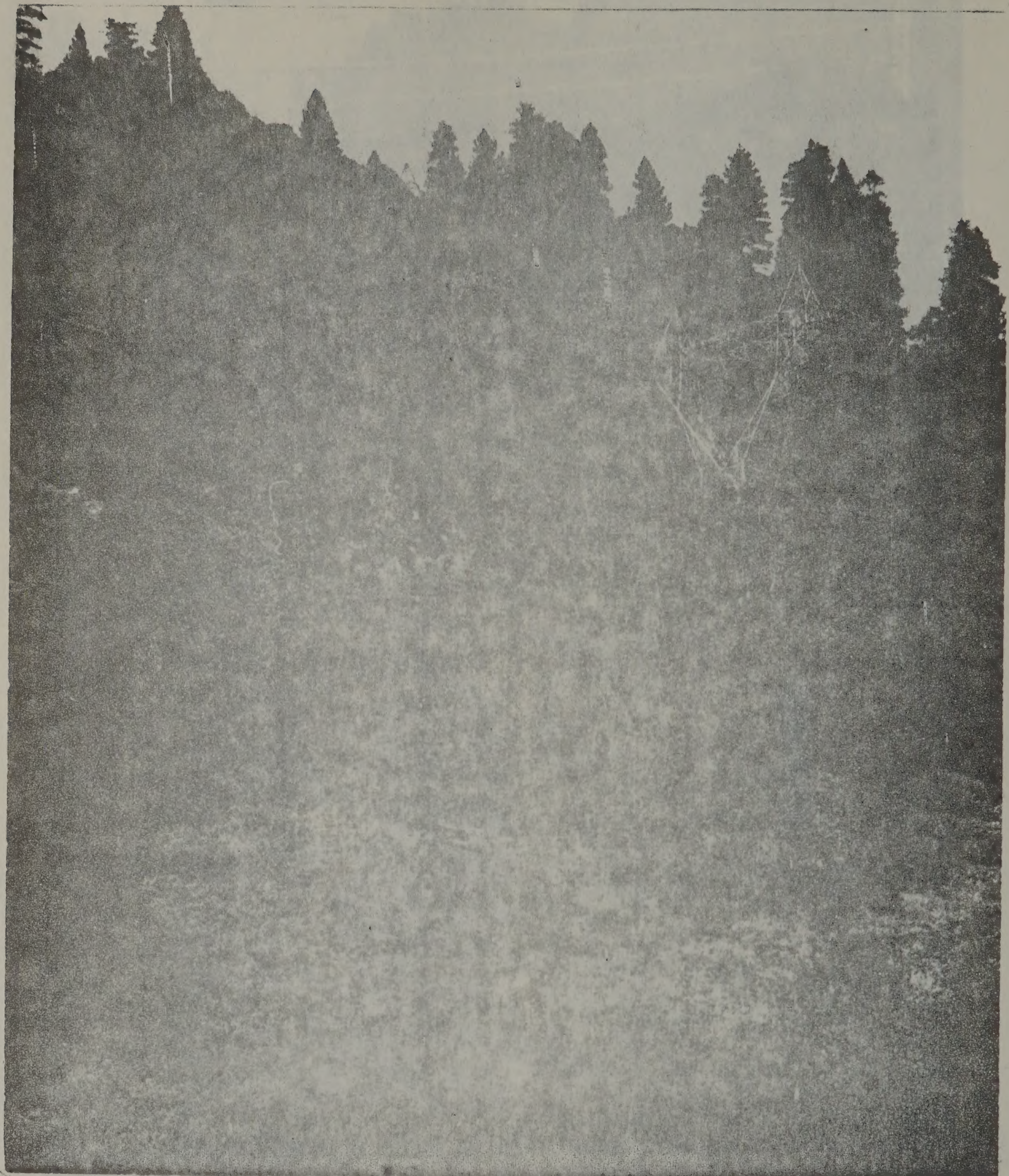


Fig. 25. Painted tower of new line at left next to unpainted old tower. Painted tower is carefully selected dark flat green which blends with background. "Belden-Rock Creek Line" of Pacific Gas and Electric Co., Plumas National Forest, California.

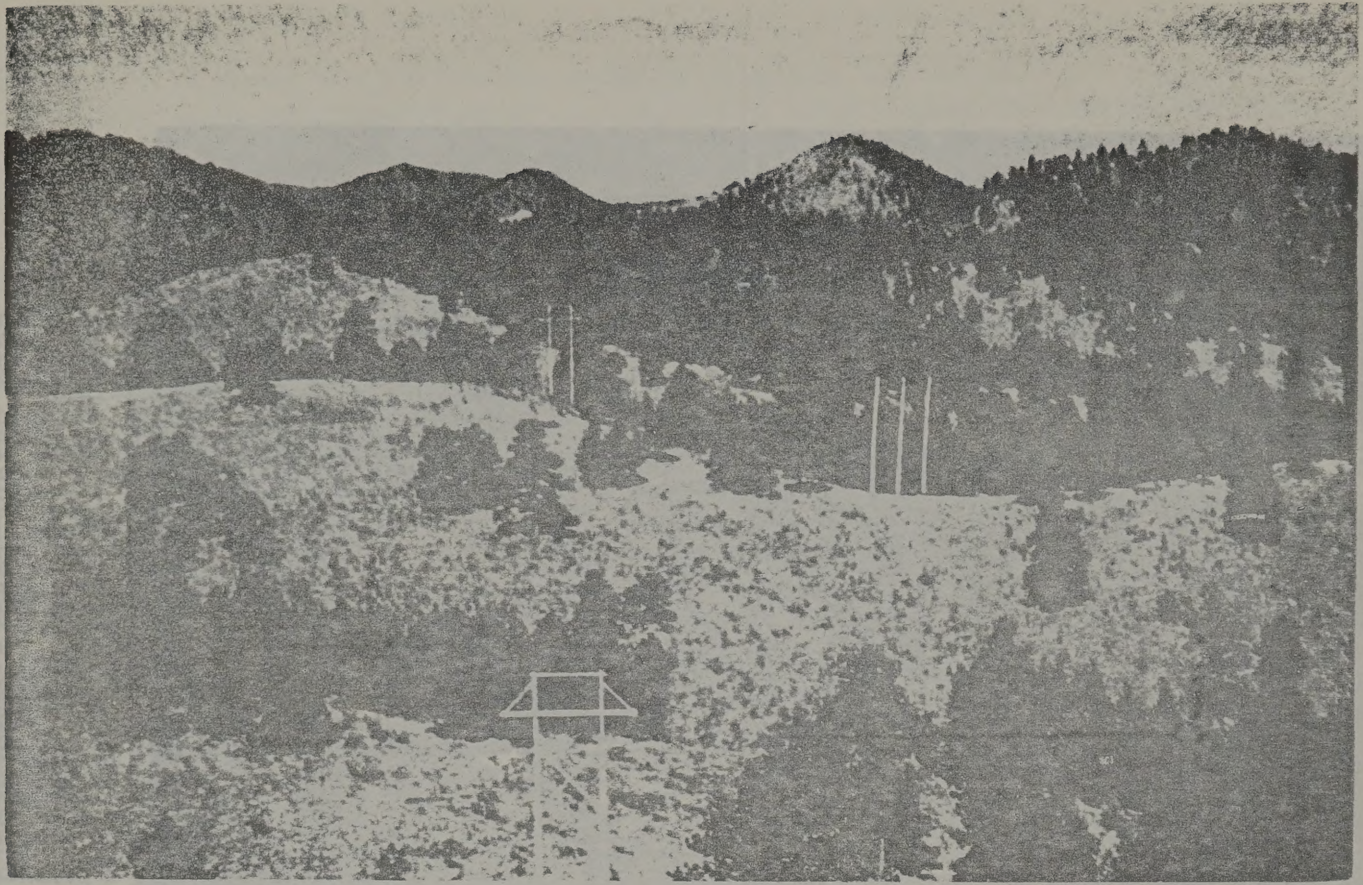


Fig. 26. Wood pole towers placed to avoid long straight sightline. "Henderson Line" of Public Service Company of Colorado. Arapaho National Forest.

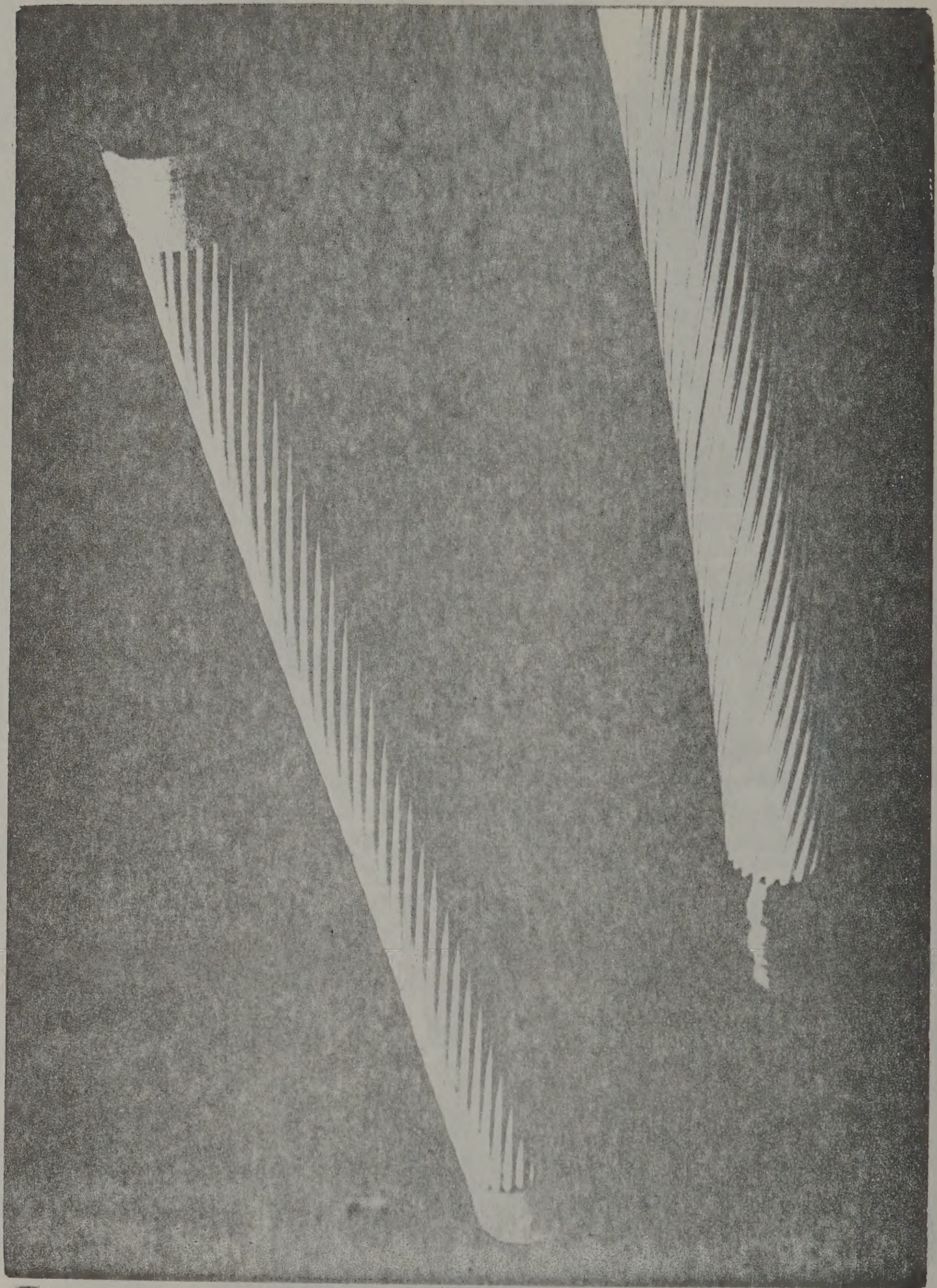


Fig. 27. Old type highly reflective aluminum conductor (left) and new dull finish non-specular aluminum conductor at right. Manufactured by Alcoa. Non-specular Conductor greatly reduces visibility of line and extra cost is trifling compared to results obtained.

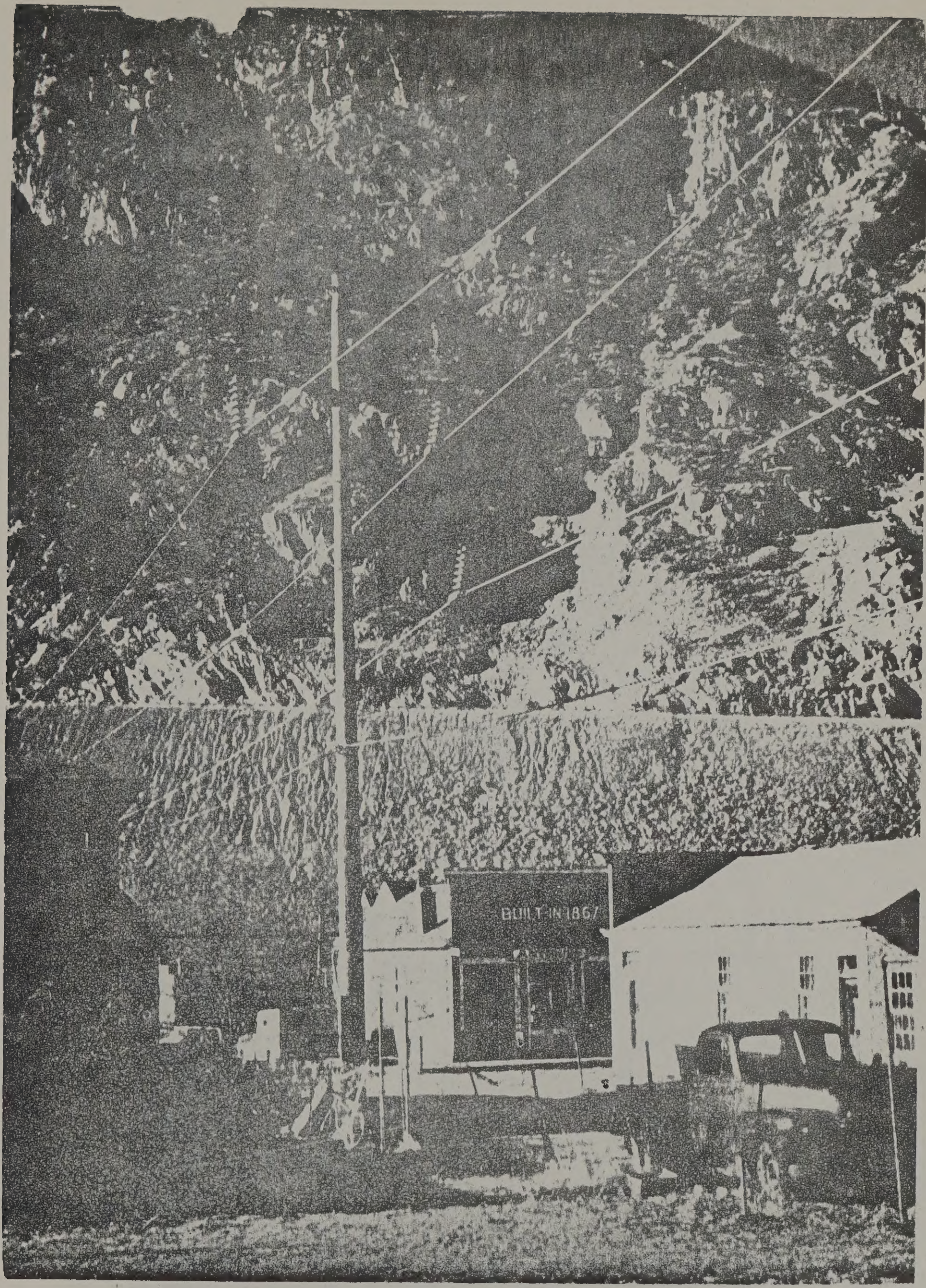


Fig. 28. Short stained wooden transmission tower in Georgetown historic area, Colorado. An unsatisfactory compromise with standard height tower. Undergrounding cost would have been justified here. Public Service Company of Colorado.

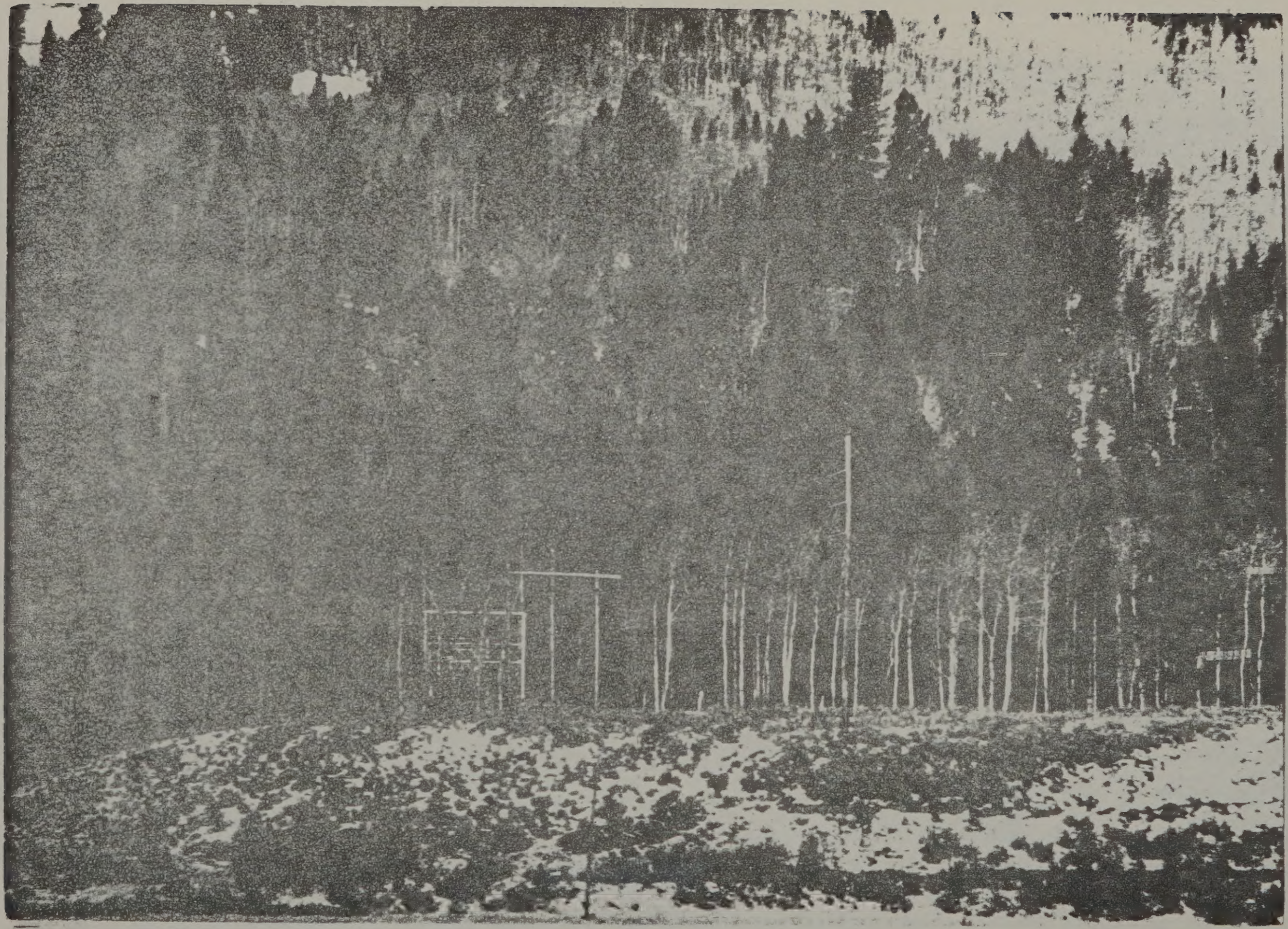


Fig. 29. The termination of transmission is the substation where distribution takes over. This substation was carefully placed in a grove of trees to reduce its visual impact. Bonneville Power Administration, Jackson Hole, Wyoming. Terminus of Swan Valley-Teton Line on private property.

APPENDIX III

WORKING COMMITTEE ON UTILITIES

REPORT
to
THE VICE PRESIDENT
and to
THE PRESIDENT'S COUNCIL
on
RECREATION AND NATURAL BEAUTY

December 27, 1968

TRANSMISSION FACILITIES: GUIDELINES IN RESPONSE TO A PRESSING NATIONAL NEED

Few states now regulate the routing of proposed transmission lines. (See Chapter III) The Citizens Advisory Committee and the Electric Utility Industry Task Force, however, have recognized the need for state controls over this matter. The Citizens Advisory Committee has stated, "we recommend that legislatures extend the authority of their public service commissions to include control over the locating of transmission lines within the state." To this end, the Task Force has recommended "that state legislatures be encouraged to extend to their regulatory agencies the right to review the routing proposed for new transmission lines by utilities under their jurisdiction where that power does not now exist."

The Working Committee on Utilities believes that the implementation of these recommendations would provide a necessary forum within which problems concerning the location of transmission lines could be orderly resolved. We believe that the laws which would extend state commission jurisdiction to encompass the location of transmission lines should include provisions requiring that applications for proposed transmission line routes be filed sufficiently in advance of construction deadlines to permit the state commissions to issue public notice of proposed routes and to permit interested persons a reasonable opportunity to file objections with the commissions. The Working Committee recommends that the procedures of the state commissions on this matter be informal. It would be during informal conferences that the advisory boards recommended by the Citizens Advisory Committee and the Task Force could be instrumental in helping to resolve disputes concerning the location of proposed transmission lines. If these informal efforts proved unsuccessful, only then would it be necessary to conduct formal, and sometimes time-consuming, regulatory proceedings.

Indispensable to the efficacy of these recommendations and those which follow are two correlative duties: one is the industry's; the other, the public's.

The industry must acknowledge by policy and deed the public's right to preserve the qualitative virtues of its natural environment. This right is, indeed, the antecedent of what the Citizens Advisory Committee has called "a new ethic." It is expressed sometimes by petition, other times not. It is vocal. It is persuasive.

No less important is the public's duty to acknowledge that the principal function of the industry is to supply energy at reasonable costs, where and when it is required. This the vitality of the Nation cannot be without. The call is thus for balance between two significant concerns: energy must be supplied and the environment must be protected. What follows in this chapter, we believe, is an effort which serves this balance.

* * *

Today, it is not technologically or economically feasible to place high voltage electric transmission lines underground for long distances. In view of this, the Electric Utility Industry Task Force has stated that until undergrounding of transmission lines is feasible, "a special burden is justifiably placed on the industry to do whatever is possible to alleviate the environmental problems caused by transmission line construction and routing." To this end, the Citizens Advisory Committee has recommended "the development of Federal guidelines for the protection of natural, historic, scenic and recreational values in the design and location of Federal power transmission lines and for non-Federal lines crossing Federal properties."

The problem, then, is how best to meet the mounting demand for electricity and to build the necessary additional transmission facilities while at the same time protecting environmental values. To begin resolving this problem, the Working Committee on Utilities has developed guidelines for the protection of these values in the design and location of electric transmission lines. Moreover, to the extent that these guidelines are pertinent to the design and location of facilities used for the transmission of natural gas, oil, oil products and communications, we believe that they should be applied to these facilities as well. As such, the guidelines are intended to be a comprehensive means for the Federal government, state governments, and private industry to mitigate uniformly the impact of all transmission facilities on the quality of the Nation's environment.

It should be emphasized from the outset that these guidelines are in no way intended to supplant the important considerations of safety, reliability of service and economic and practical feasibility which necessarily must be major determinants in the process of selecting routes for proposed transmission facilities. The guidelines, rather, are intended to be supplements to these determinants and others which now influence management decisions with respect to transmission line routing. They are predicated upon the need for thoughtful land use planning and represent qualitative matters which, for the most part, have been given little attention in the past.

The Working Committee on Utilities recommends that the guidelines we have developed be adopted by:

The Federal Government

- In the construction and maintenance of Federally owned electric and pipeline transmission facilities and communications cable facilities;
- In the authorization of other electric and pipeline transmission facilities and communications cable facilities across Federal government properties;
- In the licensing or certificating of electric and pipeline transmission facilities and communications cable facilities, which are currently subject by law to the licensing or certification jurisdiction of the Federal government, across non-Federal government properties;
- In the drafting of government contracts for the purchase of electric, telephone, telegraph or pipeline services where, incident to such purchase, electric or pipeline transmission facilities or communications cable facilities are to be constructed;
- In the administration of Federal grant-in-aid programs with respect to electric and pipeline transmission facilities and communications cable facilities to be located on land acquired or improved with Federal participation;
- In the administration of the Rural Electrification Act with respect to electric transmission facilities

and communications cable facilities to be constructed with moneys borrowed from the Federal government.

The State Governments

- In the construction and maintenance of state-owned electric and pipeline transmission facilities and communications cable facilities;
- In the authorization of other electric and pipeline transmission facilities and communications cable facilities across state government properties;
- In the licensing or certificating of the location of electric and pipeline transmission facilities and communications cable facilities, other than those which are subject to the regulatory jurisdiction of the Federal government, across non-state government properties under existing state legislation or under state legislation which should be enacted to make the location of such facilities subject to the jurisdiction of the state regulatory commissions;
- In the drafting of government contracts for the purchase of electric, telephone, telegraph or pipeline services where, incident to such purchase, electric or pipeline transmission facilities or communications cable facilities are to be constructed;
- In the administration of state grant-in-aid programs with respect to electric and pipeline transmission facilities and communications cable facilities to be located on land acquired or improved with state participation.

Industry

- In any instance not encompassed by the foregoing where the construction and maintenance of electric or pipeline transmission facilities or communications cable facilities will affect natural, historic, scenic or recreational values.

* * *

Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities

The Working Committee on Utilities has found that the form and appearance of transmission facilities can be improved if these facilities are creatively designed and constructed with the imaginative use of colors and materials. Moreover, we have found that even with improved form, the appearance of rights-of-way and transmission facilities can be further improved if they are concealed in part by the natural features of the landscape, such as the existing vegetation and terrain, and newly planted vegetation. The guidelines set forth below have followed from these general findings and are applications of them to the kinds of circumstances frequently confronted by management decision-makers in the selection of rights-of-way routes. They are not simply theories, but are objects to be achieved by practice. It is with this in mind that we strongly urge management to make these guidelines in substance a field manual to govern the planning, locating, clearing and maintenance of rights-of-way and the construction of transmission facilities.

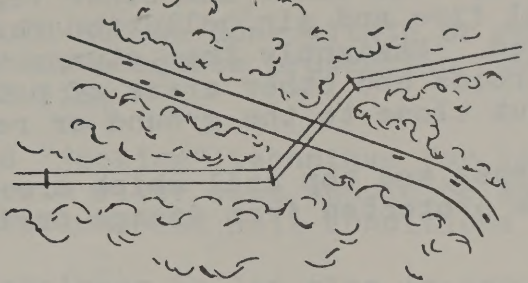
The Selection and Clearing of Rights-of-Way Routes

- Rights-of-way should be selected with the purpose of minimizing conflict between the rights-of-way and present and foreseeable uses of the land on which they are to be located. To this end, existing rights-of-way should be given priority as the locations for additions to existing transmission facilities, and the joint use of existing rights-of-way by different kinds of transmission facilities should be considered.

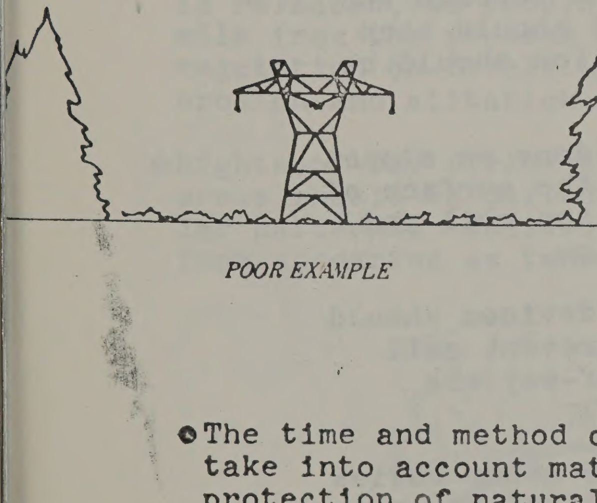
- Rights-of-way should avoid scenic, recreational and historic areas where possible. If rights-of-way must be routed through scenic, recreational or historic areas, they should be located in corridors least visible from areas of public view.

- Rights-of-way should avoid heavily timbered areas, steep slopes and proximity to main highways where possible.

- Long views of transmission lines perpendicular to highways, down canyons and valleys or up ridges and hills should be avoided. The lines should approach these areas diagonally and should cross them at a slight diagonal.



- Rights-of-way clearings should be kept to the minimum width necessary to prevent interference of trees and other vegetation with the proposed transmission facilities. Trees which would interfere with the proposed transmission facilities and those which could cause damage if fallen should be selectively cut and removed.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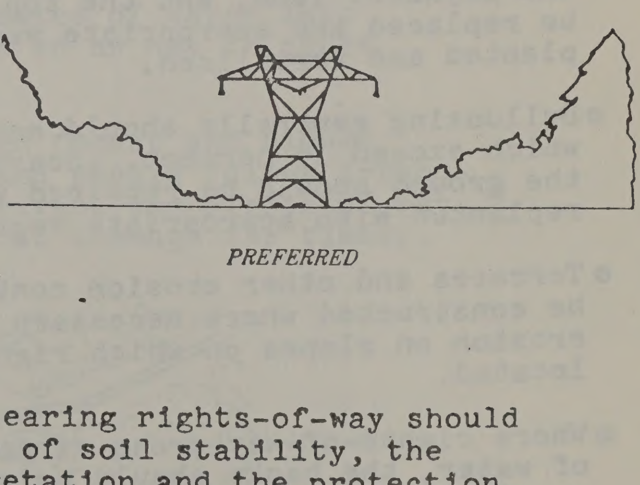
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- The time and method of clearing rights-of-way should take into account matters of soil stability, the protection of natural vegetation and the protection of adjacent resources.

- The use of helicopters for the construction on rights-of-way should be considered in mountainous and scenic areas. This would permit rights-of-way to be located in more remote areas and would reduce disturbance of the ground and the number of access roads.

- Trees and other vegetation cleared from rights-of-way in areas of public view should be disposed of without undue delay. If trees and other vegetation are burned, local fire and air pollution regulations should be observed. Unsightly tree stumps which are adjacent to roads and other areas of public view should be cut close to the ground or removed.

- Trees, shrubs, grass and top soil which are not cleared should be protected from damage during construction.

- Rights-of-way should not be cleared to the mineral soil where possible. Where this does occur in scattered areas of the rights-of-way, the top soil should be replaced and stabilized without undue delay by the planting of appropriate species of grass, shrubs and other vegetation which are properly fertilized.

- Soil which has been excavated during construction and not used should be evenly filled back onto the cleared area or removed from the site. The soil should be graded to comport with the terrain and the adjacent land, and the top soil should then be replaced and appropriate vegetation should be planted and fertilized.

- Bulldozing generally should not be done on slopes which exceed 35 percent. Scars on the surface of the ground should be repaired with top soil and replanted with appropriate vegetation.

- Terraces and other erosion control devices should be constructed where necessary to prevent soil erosion on slopes on which rights-of-way are located.

- Where rights-of-way cross streams or other bodies of water, the banks should be stabilized to prevent erosion. Construction on rights-of-way should not damage shorelines, recreational areas or fish and wildlife habitats.

- Replacement of earth adjacent to water crossings should be at slopes less than the normal angle of repose for the soil type involved and sodding or seeding should be accomplished without undue delay.

- Rights-of-way should cross streams or other bodies of water at low lands rather than at high banks or wild areas where possible.

- Blasting should not be done within or near stream channels without adequate protection for fish and other aquatic life.

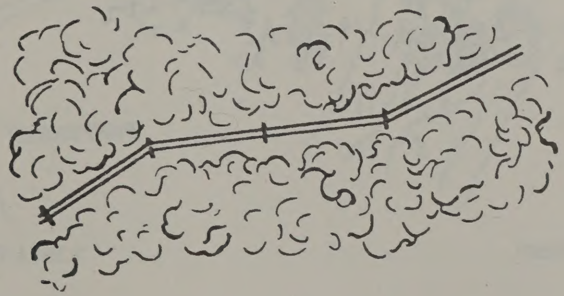
- The so-called "jacking" technique for laying pipe or cable beneath river beds should be used where approach elevations and soil conditions permit.

- Cofferdam techniques to lay pipe or cable across streams should be used in order to permit full flow in one part of the stream while construction work is being performed in another part.

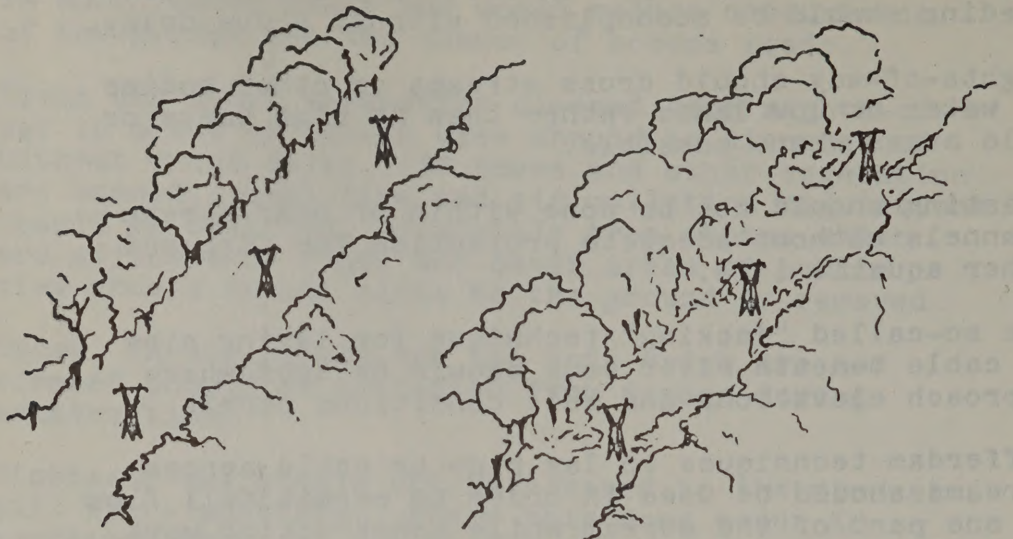
- Care should be taken to avoid oil spills and other types of pollution while work is performed in streams.

- Water used for pipe testing purposes and taken from streams or other bodies of water should be limited to volumes which will not cause harm to the ecology or aesthetics of the area. When the testing water is released, it should be done at least one-fourth mile from the streams or bodies of water into vegetation on levels upland so as not to cause erosion and siltation.

- Rights-of-way strips through forest and timber areas should be deflected and should follow irregular patterns. This will prevent the rights-of-way from appearing as tunnels cut through the timber.



- Rights-of-way strips through forest and timber areas should be cleared with curved, undulating boundaries and trimmed to comport with the topography of the terrain.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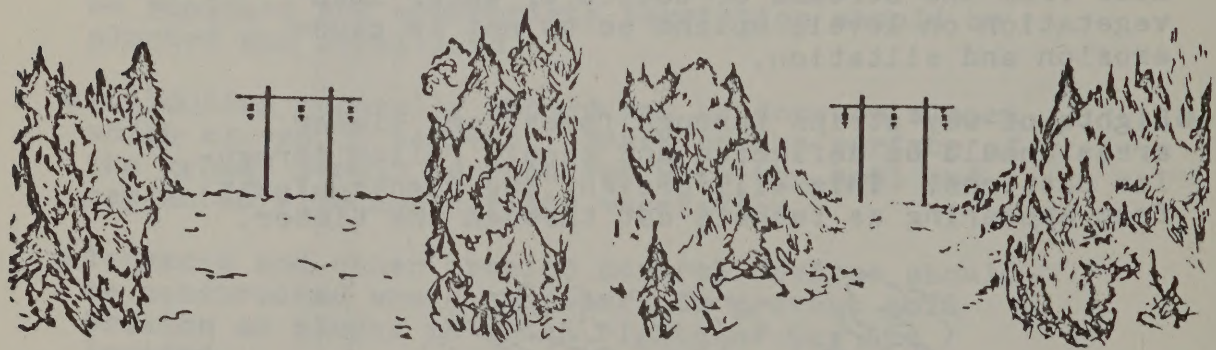
- Small trees and plants should be used to feather back the rights-of-way from grass and shrubbery to larger trees.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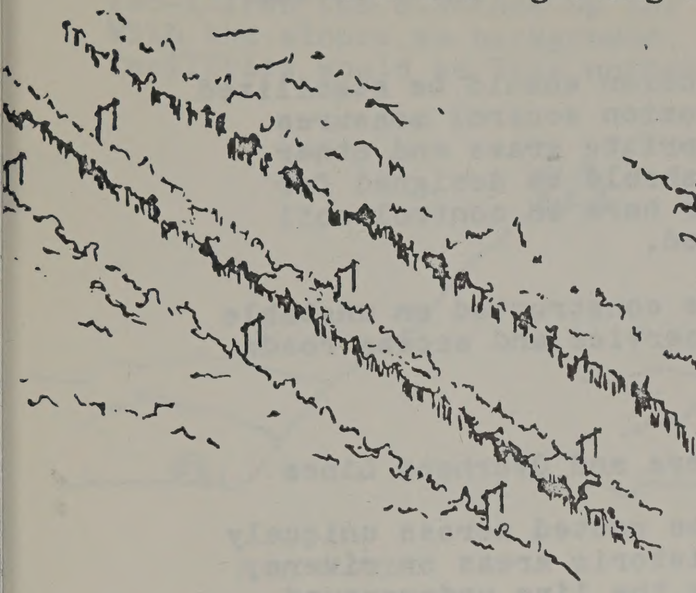
- Where there are several adjacent rights-of-way, low-growing vegetation should be planted between them if possible. Groves of trees should be maintained with lower growing shrubbery on the periphery.



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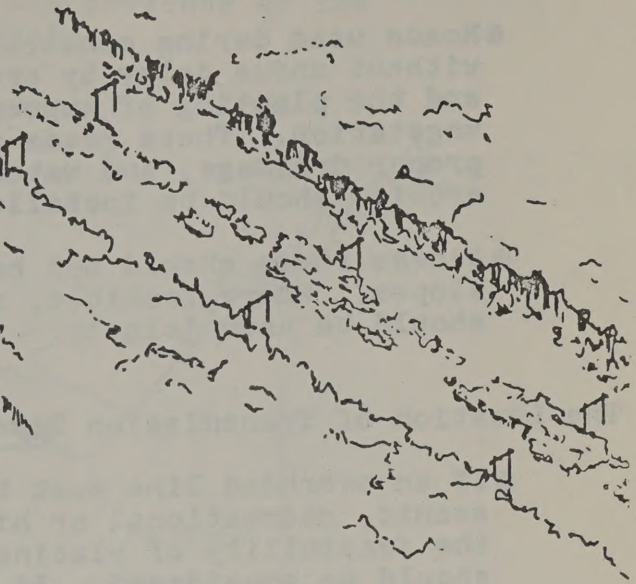

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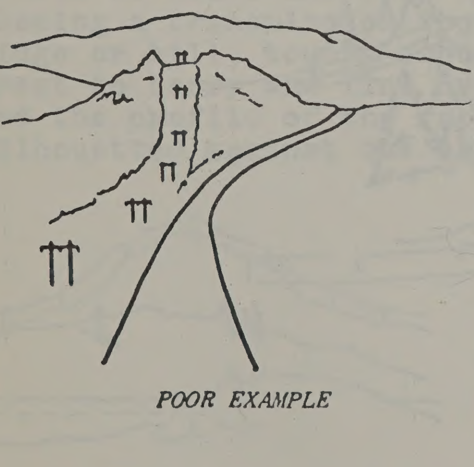
- Rights-of-way should not cross hills and other high points at the crests.



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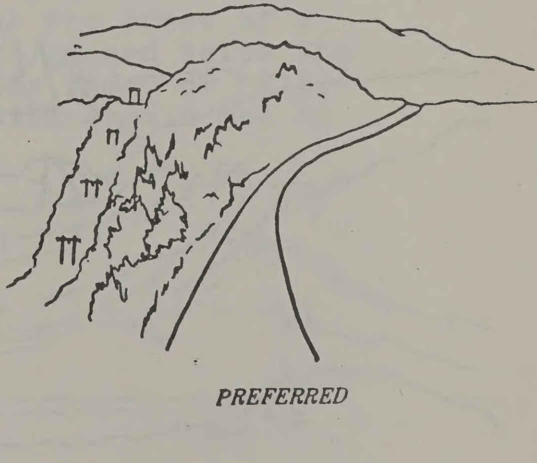

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- If underground transmission lines must be located near the crests of hills or other high points, trenching should be done with small equipment in order to minimize the width of the rights-of-way clearings.

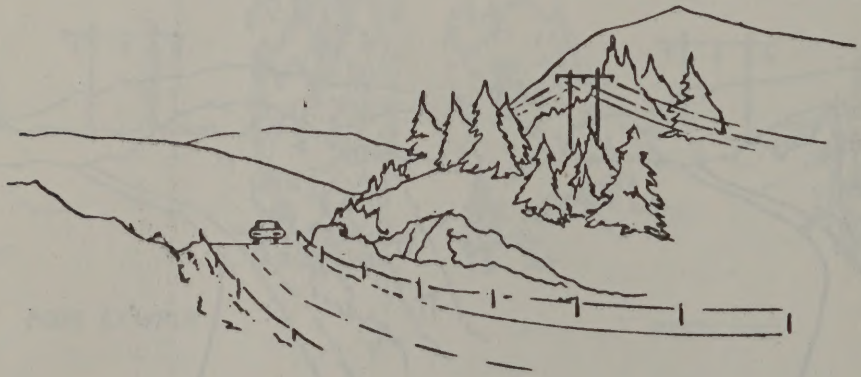
- Roads used during construction should be stabilized without undue delay by erosion control measures and the planting of appropriate grass and other vegetation. These roads should be designed for proper drainage, and water bars to control soil erosion should be installed.

- Access roads should not be constructed on unstable slopes. Where feasible, service and access roads should be used jointly.

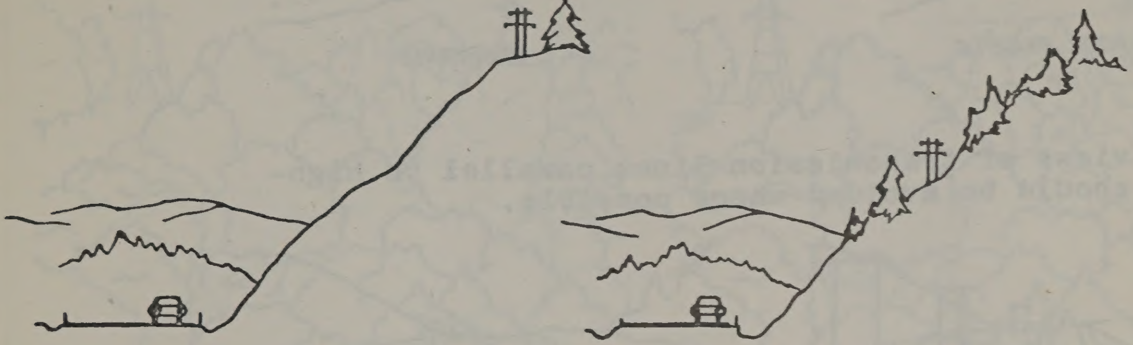
The Location of Transmission Towers and Overhead Lines

- If an overhead line must be routed across uniquely scenic, recreational or historic areas or rivers, the feasibility of placing the line underground should be considered. If the line must be placed overhead, it should be located on a right-of-way least visible from areas of public view.

- Transmission facilities should be located with a background of topography and natural cover where possible. Vegetation and terrain should be used to screen these facilities from highways and other areas of public view.



- Where transmission facilities must be placed on slopes which parallel highways or other areas of public view, they should be located approximately two-thirds the distance up the slopes where feasible. With the slopes as background, the presence of the facilities would be less noticeable.



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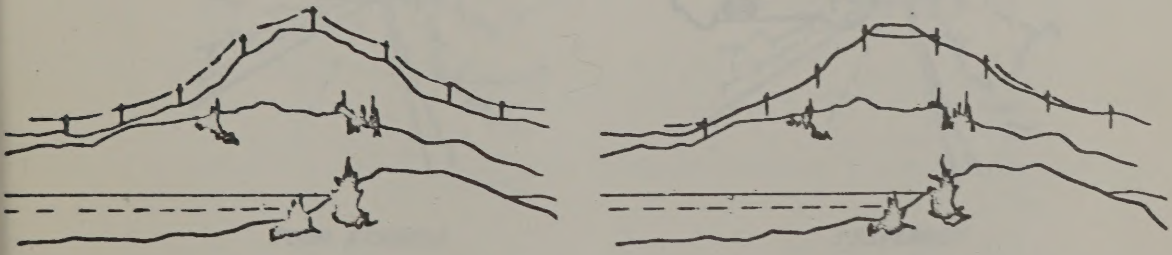
- Transmission line towers which are in areas of public view should not be placed in a straight-line pattern for long distances through forest or timber areas. They should follow an irregular pattern along rights-of-way alignments which have been deflected.

- Transmission line towers should generally follow the contours of the land.

- Transmission facilities should not cross the crests of hills and other high points. To avoid placing a transmission tower at the crest of a ridge or hill, towers should be spaced below the crest to carry the line over the ridge or hill, and the profile of the facilities should not be silhouetted against the sky.



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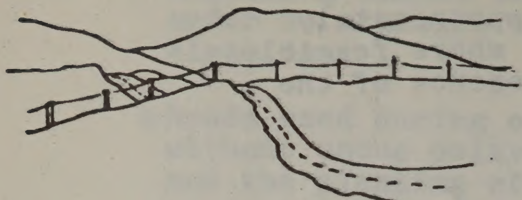
- Transmission lines should not cross highways at the crest of a road or the bottom of a valley.



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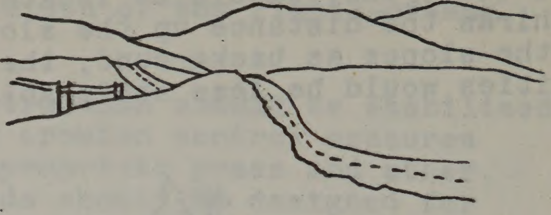

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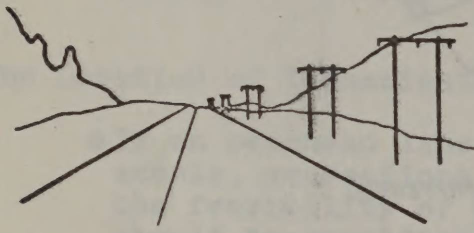
- Long views of transmission lines parallel to highways should be avoided where possible.



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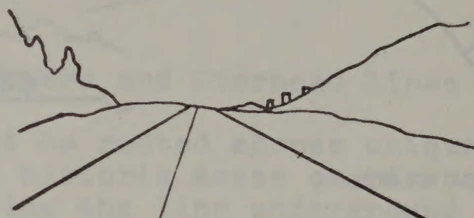

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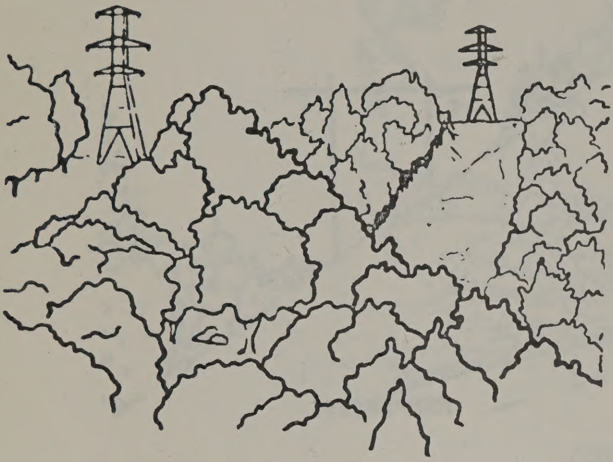
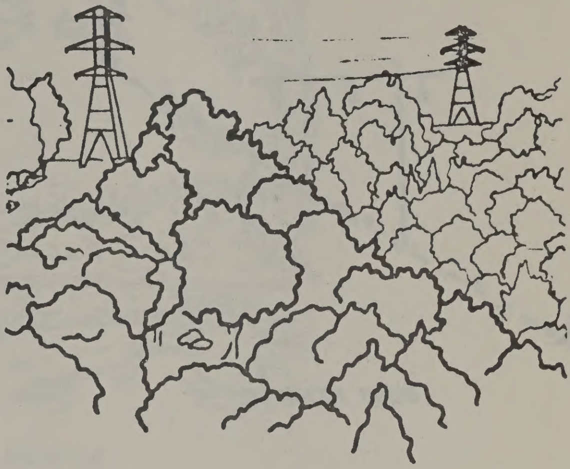
- Transmission lines should cross canyons up-slope from roads which traverse the canyon basins if the terrain permits.

- When crossing valleys in a forest, high, long-span towers should be used to keep the power lines above the trees and to eliminate the need to clear all vegetation from below the lines. Only as much vegetation as is necessary to string the line should be cut.



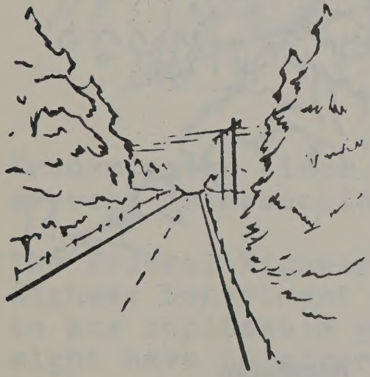
POOR EXAMPLE



PREFERRED

- Where ridges or timber areas are adjacent to highways or other areas of public view, overhead lines should be placed beyond the ridges or timber areas.

- In forest or timber areas, high, long-span towers should be used to cross highways in order to retain much of the natural growth along the highways.



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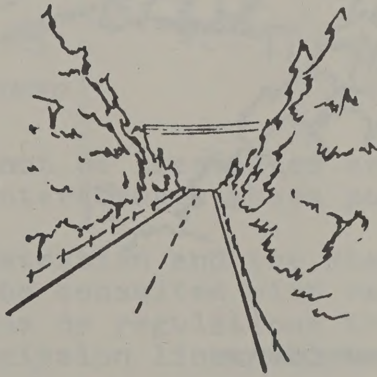
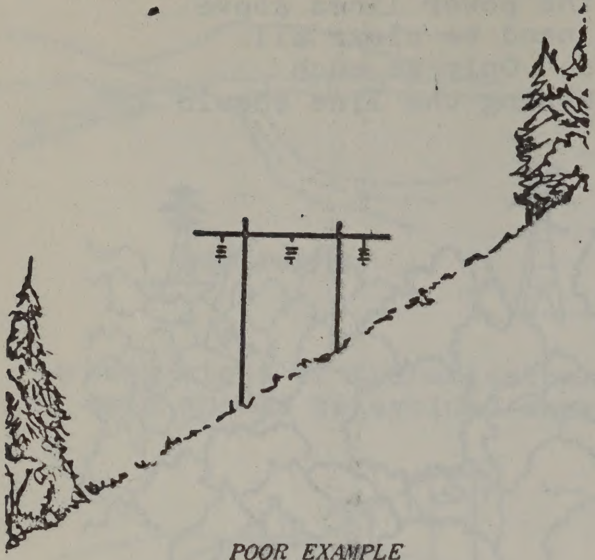


PREFERRED

- Rights-of-way should cross hills and mountains obliquely rather than straight up and down the sides.



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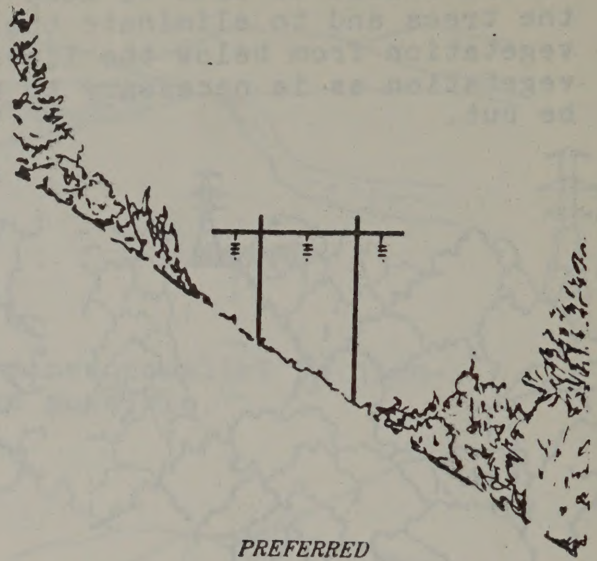
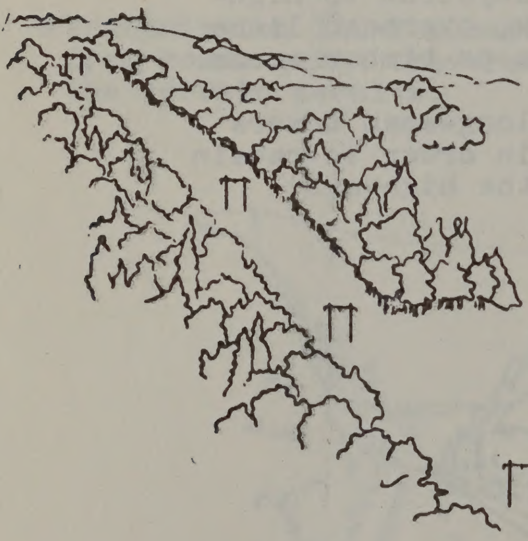


PREFERRED

- Where rights-of-way enter dense timber from a meadow or other clearing, trees should be feathered in at the entrance of the timber for a distance of 150-200 yards.



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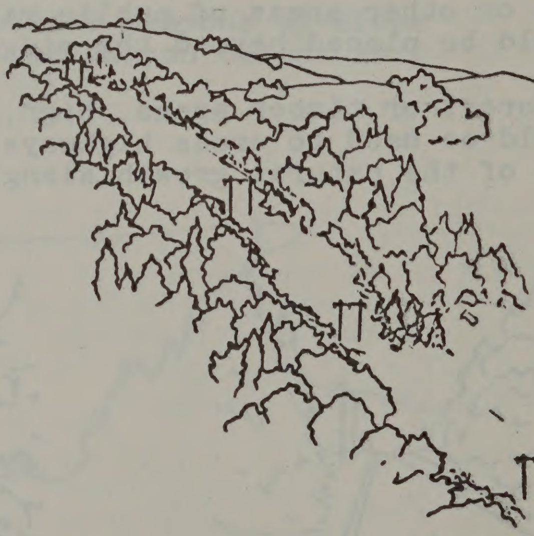
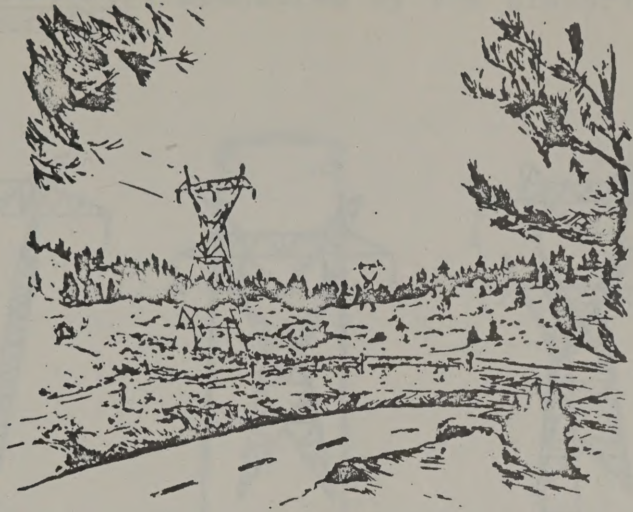


PREFERRED

- Native shrubs and trees should be left in place or planted randomly, with the necessary allowance for safety, near the edges of rights-of-way adjacent to roads.



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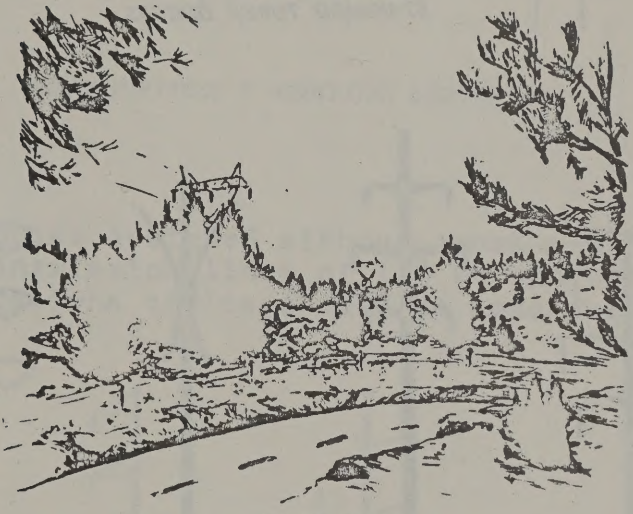


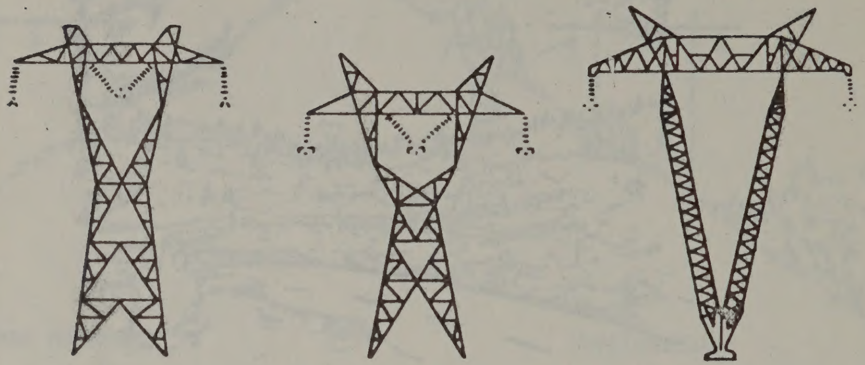
PREFERRED

- Transmission lines should not be located or cross at road intersections or interchanges where possible.

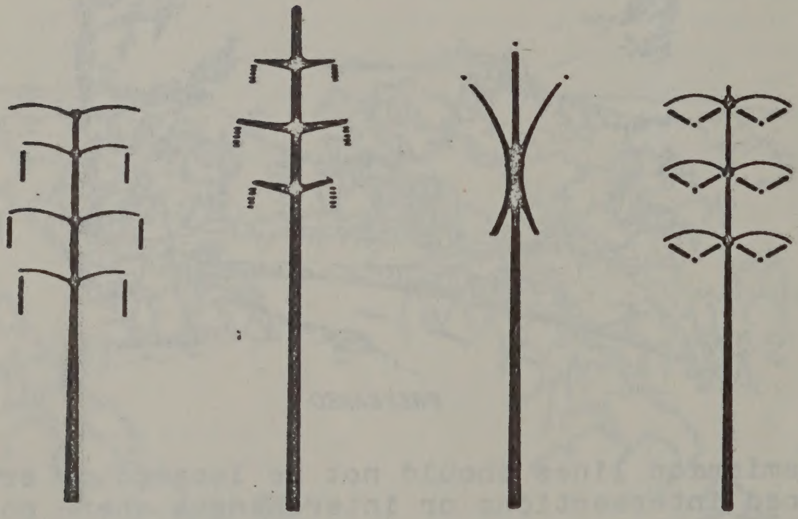
- The Federal Highway Administration and the State Highway Department should be consulted with respect to any applicable guidelines or regulations they might have to govern transmission lines which cross highways.

The Design of Transmission Towers

- The size of transmission towers should be kept to the minimum feasible.

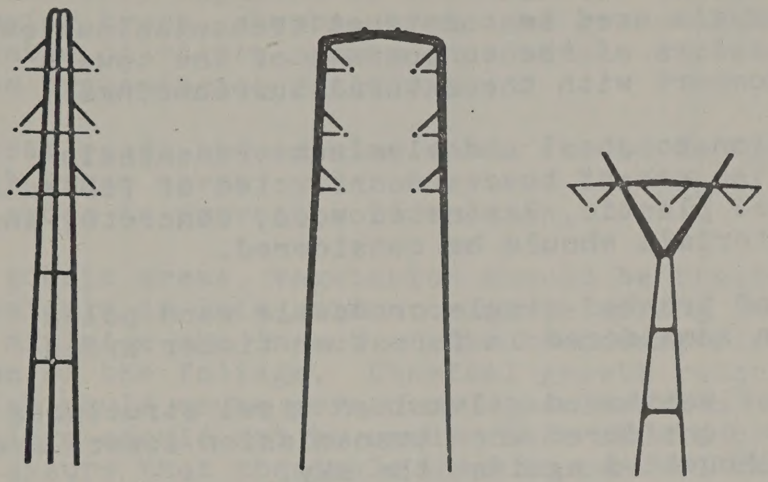


STANDARD TOWER DESIGNS



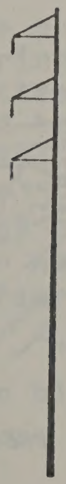
NEWER TOWER DESIGNS

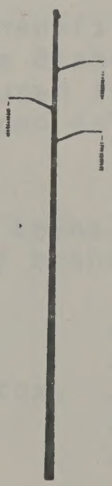
- Simple, but functional, designs of towers and poles should be used. Illustrations of these kinds of structures can be found in the book Electric Transmission Structures, sponsored by the Electric Research Council.



HENRY DREYFUSS & ASSOCIATES DESIGNS

- The use of poles designed without cross-arms for electric transmission lines of 138 kv and below and communications cables should be considered.





- The use of different tower designs at intervals along rights-of-way should be considered.

- Transmission towers should be spaced apart at the maximum feasible distance which would not cause unsightly tower height, conductor sag, or excessive removal of trees.

- The materials used to construct transmission towers and the colors of the components of the towers should comport with the natural surroundings.

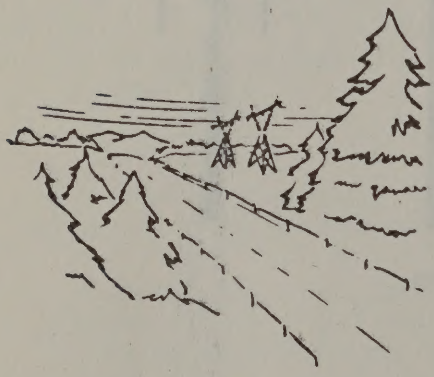
- In addition to steel and aluminum transmission towers, the use of towers constructed of fiberglass, reinforced plastic, laminated wood, concrete, and other materials should be considered.

- The use of treated single or double wood poles should be considered in forest or timber areas.

- The use of weathered galvanized steel structures should be considered when transmission towers are to be silhouetted against the sky.

- The form of the insulator should be integrated with the form of the transmission tower. Where both a strain insulator and a post insulator are used on a single tower, the designs of each should be coordinated with the form of the tower.

- Where two or more circuits are required at highway crossings, the use of multiple circuit towers should be considered.



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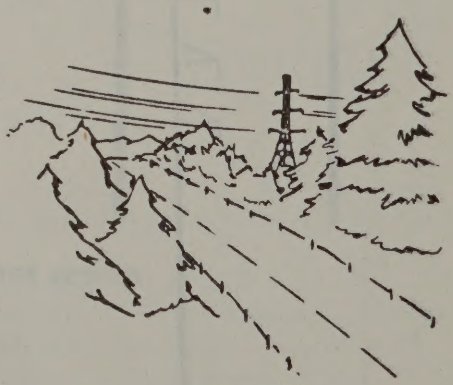


PREFERRED

The Maintenance of Transmission Line Rights-of-Way

- Once a cover of vegetation has been established on a right-of-way, it should be properly maintained.

- A grass cover should be maintained in the areas immediately adjacent to transmission towers. Low growing trees, shrubs, herbs and grass should be planted on rights-of-way at adequate distances from transmission facilities.

- Access roads and service roads should be maintained with grass cover, water bars and the proper slope in order to prevent soil erosion.

- In scenic areas, vegetation should be treated with chemicals in late autumn or early spring in order to minimize the impact of the temporary discoloration of the foliage. Chemical growth retardants which would cause permanent discoloration of the foliage should not be used. Care should be taken to assure that chemicals used to control the growth of tree stumps do not damage other vegetation.

- When rights-of-way are inspected to check the operation of appurtenant facilities, attention should be given to locate gullies and fallen timber and to observe the condition of the vegetation. The use of aircraft to inspect and maintain rights-of-way should be encouraged.

Possible Secondary Uses of Rights-of-Way

One of the potential benefits of transmission line routes is that clearings at safe distances adjacent to transmission facilities may be used for secondary purposes. The following should be considered as possible secondary uses of rights-of-way:

--Cultivation of Christmas trees, elderberry or huckleberry bushes, and other nursery stock.
--Parks.
--Golf courses.
--Equestrian or bicycle paths.
--Orchards.
--Picnic areas.
--Bird sanctuaries.
--Game refuges.
--Hiking trail routes.
--General agriculture.
--Winter sports.

The Location of Appurtenant Aboveground Facilities

- The proposed designs and locations of electric substations, pipeline compressor stations, pumping stations, cooling stations, and other aboveground facilities, including meter and regulator stations and communication towers, should be made available to local agencies which have jurisdiction over these matters sufficiently in advance of construction deadlines to permit adequate review.

- Unobtrusive sites should be selected where possible for the location of substations and like facilities.

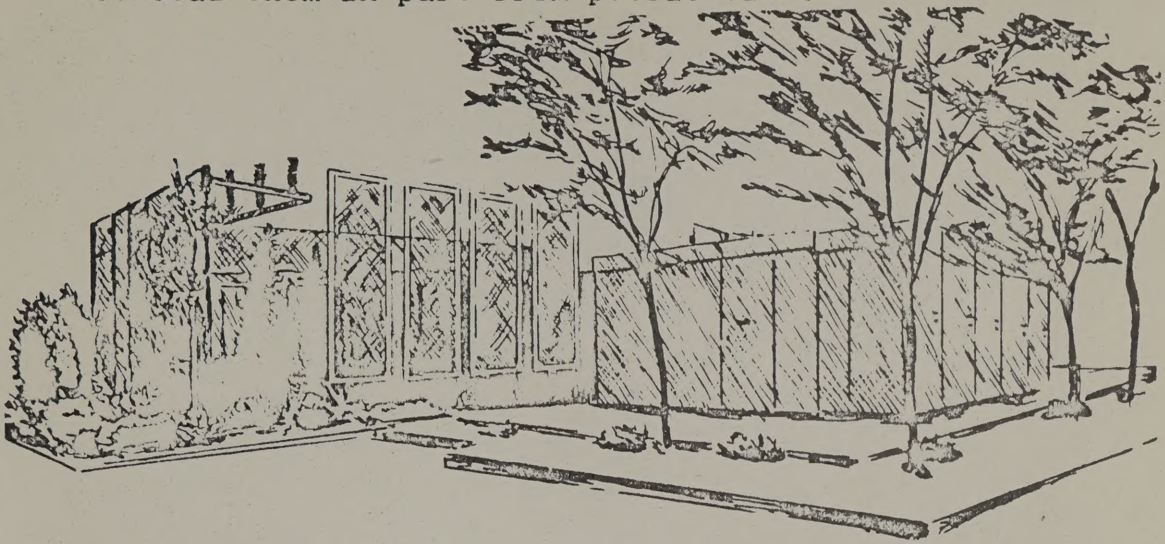
- Potential noise should be considered when the locations for gas turbines, substations and like facilities are being determined. Such facilities should be located in areas where sound will not be resonated.

- The size of substations and like facilities should be kept to the minimum feasible.

- The designs of the exteriors of substations and like facilities should comport with the surroundings and other buildings in the area. For example, if a substation is to be located in a residential area, its design should comport with the designs of nearby residences.

- If substations are located in residential or other scenic areas, the appurtenant transmission conductors and distribution conductors adjacent to the substations should be placed underground.

- Trees and shrubs should be planted in the area adjacent to substations and like facilities in order to conceal them in part from public view.



- Storage tanks in scenic areas should be placed belowground where feasible. If storage tanks must be placed aboveground, they should be concealed in part by appropriate plantings of trees and shrubs.
- The materials used to construct substations, storage tanks and like facilities and the colors of these materials should comport with the surroundings.

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